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Some Physical-Chemical Properties of 1,2-Dichloroethane

917M0118K Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 91 pp 81-82

[Article by M. G. Avetyan, E. V. Sonin, I. F. Pimenov]

UDC 66.062.412.22-13

[Abstract] Solubility of chlorine, hydrogen chloride, vinyl chloride and water in 1,2-dichloroethane was investigated in a wide temperature interval (-10 to +60° C) and partial pressure of these compounds ranging from 200 to 700 mm Hg. The data obtained was used to plot the equilibrium curve in the moisture concentration range 0.002-0.010%. This curve supported the assumption about a strong effect of moisture concentration on the value of the separation coefficient. The separation coefficient in the concentration range 0-0.001% is close to one and therefore attempts to dry 1,2-chloroethane by distillation to the level of <0.001% are impractical The coefficient of relative volatility increases rapidly with increasing water concentration which explains the relative ease of drying 1,2-dichloroethane down to 0.01% level of water content by distillation in an even moderately effective column. Figures 2; table 1; references: 3 (Russian).

Catalyst for Oxidative Decomposition of Polycyclic Organic Compounds Used in Analysis on Hewlett-Packard Automatic CHN- Analyzer

917M0139A Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 46 No 3, Mar 91 (manuscript received 27 Nov 89) pp 493-499

[Article by V. P. Miroshina, Ye. M. Dubina, Scientific Research Institute of Organic Intermediates and Dyes, Moscow]

UDC 543.84

[Abstract] The goal of this work was to prepare a catalyst with highest oxidative activity to be used in the breakdown of aromatic and heterocyclic compounds. A Hewlett-Packard 185B automatic CHN-analyzer was used for the defemination of the principal elements. The catalyst consisted of 30% $K_2Cr_2O_7$, 60% MnO_2 and 10% SiO_2, which, in analysis of polycyclic and macrocyclic aromatic and heterocyclic compounds, gave values with the following standard deviations: carbon: 0.14-0.23%, hydrogen: 0.11-0.26% and nitrogen: 0.08-0.26%. Based on the analysis of X-ray electronic spectroscopy an assumption was made that the active component of the catalyst used is CrO_3. The presence of excess CrO_3 supports an adequately high level of the active oxygen in the reagent, assuring its oxidative effectiveness. Tables 5; references 26: 12 Russian (1 by Western author), 14 Western.

Distribution of Bidentate Phosphine Oxides Between Silica Gel With an Immobilized C_8 Phase and Acetone-Water Mixtures. Relationship Between Partition Constants in Extraction and Chromatography

917M0139B Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 46 No 3, Mar 91 (manuscript received 17 Apr 90) pp 500-505

[Article by V. V. Salov, Ye. A. Demchenko, O. M. Petrukhin, Institute of Geochemistry and Analytical Chemistry imeni V. I. Vernadskiy, USSR Academy of Sciences, Moscow, Moscow Chemical- Technological Institute imeni D. I. Mendeleyev]

UDC 543.544.542

[Abstract] Neutral bidentate phosphine oxides (PO) appear to be carriers of ions in ionic selective electrodes. Selecting desired electrode components, it is necessary to know the partition constants of PO. In this work thin layer chromatography was used to investigate partition of eighteen POs between silica gel with an immobilized C_8 phase and several acetone-water mixtures, varying the content of acetone from 50 to 90%. A relationship was found between the extraction and chromatographic partition constant of PO. The R_m was linearly related to the %-content of the acetone and, extrapolated to zero, the R_m values were additive in respect to the molecular fragments of the substance being partitioned. The increment values showed a linear correlation with the functional group contributions to the logarithm of the distribution constants in the system water- nitrophenyloctyl ester. The R_m-content of acetone functional curves intersected at one point and this could be used in estimating the thickness of the adsorption layer of the stationary phase. Tables 3; references: 6 (Russian, 1 by Western author).

Partition of Aromatic Nitro Compounds Between Organic Phases of Ternary-Phase Extraction Systems

917M0139C Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 46 No 3, Mar 91 (manuscript received 11 Oct 89) pp 506-512

[Article by V. I. Kofanov, V. A. Frankovskiy, I. N. Rebik, Institute of Colloidal Chemistry and Chemistry of Water imeni A. V. Dumanovskiy, UkSSR Academy of Sciences, Kiev State University imeni T. G. Shevchenko]

UDC 542.61:547.551

[Abstract] In a previous work it was established that the most universal ternary phase extraction system (TES) consists of 3M NaCl-acetonitrile-hexane components. Partition coefficients were determined for alkyl and halogen substituted nitrobenzene and nitronaphtalene between the organic phases of this system and compared with partition of these compounds in the system of

acetonitrile-hexane in absence of water. It was shown that addition of the aqueous salt phase to the binary phase extraction system (BES) lowered the partition coefficient by 10-20%. This decrease in the extraction coefficient was shown to be directly related to the amount of water dissolved in the polar solvent phase. The pH value of the aqueous phase showed no effect on the partition between the organic phases of TES. The results obtained could be used in controlling extraction partition coefficients of various nitro compounds as well as in prediction of chromatographic mobility on hydroxylated silica gel in TES. Figure 1; tables 6; references 13: 11 Russian, 2 Western (1 by Russian author).

Imidazolylisoquinolines—Novel Highly Sensitive and Selective Reagents for Determination of Copper

917M0139D Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 46 No 3, Mar 91 (manuscript received 5 Dec 89) pp 513-518

[Article by L. A. Pilipenko, L. L. Kolomiyets, E. F. Gavrilova, Yu. M. Volovenko, A. G. Nemazanyy, V. V. Trachevskiy, Kiev State University imeni T. G. Shevchenko]

UDC 541.49:542.61:546.57

[Abstract] The complex formation of copper (II) with 3-amino- 2-benzyl-4-(1-methylbenzylimidazol-2-yl)-7-nitro-1(2H)isoquinolone (A) and 3-amino-2-methylbenzyl-4-(1-methylbenzimidazol-2-yl)-7- nitro-1(2H)isoquinoline (L) was investigated showing that they could be used in a sensitive, highly selective analysis of copper. The copper is removed in form of a highly colored complex CuA_2 and CuL_2 at pH 7.0-8.5. Molar absorption coefficients are $4x10^4$ (A) and $3.8x10^4$ (L) at 470 nm; their dual phase stability constants are $(1.1+/-0.3)x10^8$ and $(2.8+/- 0.5)x10^8$ respectively. Tested on a standard reference sample of a molybdenum concentrate A-127 which contains Cu, Mo, Zn, Pb, Fe, Al_2O_3, K, Na, Bi, TiO_2, P, SiO_2 and S, this method gave satisfactory analytical results without interference from any of the above elements. Figures 3; tables 2; references :6 (Russian).

Simultaneous Titration Determination of Osmium (VIII) and Ruthenium (VI) Using two Titrating Reagents

917M0139E Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 46 No 3, Mar 91 (manuscript received 29 Jan 90) pp 566-570

[Article by A. A. Volkov, V. S. Khain, Ukhinsk Industrial Institute]

UDC 543.257.1:546.94

[Abstract] The goal of this work was to develop an analytical method for the sequential determination of osmium (VIII) and ruthenium (VI) in alkaline solutions without preliminary separation, using potentiometric titration of a single analytical sample. Experiments showed that it was impossible to determine simultaneously Os(VIII) and Ru(VI) by a single titration with sodium tetrahydroborate. The following method worked, however. Initially Os(VIII) was determined with sodium tetrahydroborate and then the mixture of Os(VI) and Ru(VI) formed in this process was titrated with hydroxylamine. The content of ruthenium was determined from the difference of these values. This method is useful in the range of Os(VIII) of 7.6-200 mg and of Ru(VI) range of < 4.04 mg in 20 ml of the analytical solution. Figures 3; tables 2; references: 10 (Russian).

Investigation of Bismuth-Lead Superconducting Ceramic Composition by X-ray Fluorescence Method

917M0139F Moscow ZHURNAL ANALITICHESKOY KHIMII in Russian Vol 46 No 3, Mar 91 (manuscript received 14 Dec 89) pp 591-594

[Article by N. I. Shevtsov, Z. M. Nartova, L. A. Kvichko, A. B. Blank, Scientific-Industrial Association "Monokristallreaktiv", Kharkov]

UDC 543.945:543.422.8

[Abstract] The synthesis of bismuth-lead superconducting ceramics is a multi-stage process of long duration involving considerable losses of the starting components. To optimize the solid phase synthesis of such ceramics, exact composition of the samples involved must be known. One of the most promising analytical methods is the x-ray fluorescence spectral analysis, a rapid, reproducible method which requires special calibration specimens such as the dioxides of the elements being analyzed. Using this method, the stoichiometry of superconducting ceramic based on Bi-Pb-Ca-Se-Cu-O was determined. Uniform glass-like emitters were obtained by fusing the analytical sample with a 19- fold excess of the flux (lithium metaphosphate containing 10% lithium carbonate). Mechanical treatment of the working surface of the emitter resulted in lowering the errors due to sample preparation. The systematic errors were statistically insignificant. The analytical deviations in determining the individual elements were: Pb= +/- 0.003%, Bi= +/- 0.005%, Ca= +/- 0.01% and Cu= +/- 0.002%. It was shown that lead, calcium and copper were lost in the solid phase synthesis. Tables 3; references: 2 (Western).

New Polymetallic Reforming Catalysts

917M0075A Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 p 4-6

[Article by Yu. N. Kolomytsev, A. S. Belyy, V. K. Duplyakin et al.; Omsk Department; Institute of Catalysis; USSR Academy of Sciences: Siberian Department; Ryazan Petroleum Processing Plant]

UDC 665.644.44.097.3

[Abstract] Mastery of a new technology of production of selective reforming catalysts at the Ryazan Petroleum Processing Plant resulted in the output of experimental batches of polymetallic catalysts SHPR-2 and PR-42 mark A and mark B. A complete cycle of studies of the catalysts SHPR-2 and PR-42B to determine activity, selectivity, stability of operation and regulativity showed the advisability of using these catalysts in industrial reforming processes. Figures 7; references 7: 5 Russian; 2 Western.

New Catalysts For Hydrorefining Processes

917M0075B Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 7-8

[Article by V. N. Podlesnyy, I. I. Zadko, S. L. Mund and R. K. Nasirov; Electrogorsk Branch of the All-Union Scientific Research Institute of Petroleum Processing]

UDC 66.097.38:665.64

[Abstract] New catalysts developed at the Elecktogorsk Branch of the All-Union Scientific Research Institute of Petroleum Processing which have specific properties for effective performance of specific processes were described and discussed. Catalysts used in petroleum distillates hydrorefining processes were emphasized. Improvement of stages of synthesis and preliminary activation of the catalysts made possible performance of hydrorefining processes at a 30-40° temperature and a 10-30 percent increase of volumetric rate of feed of raw material with a trend toward an increase of the length of service. Basic principles of development of such catalysts were used to develop some promising samples of catalysts. Catalysts of strictly specific compositions must be used for each raw material and process in refining petroleum distillates. Figure 1; references 3 (Russian).

Catalysts of Secondary Distillates Hydrorefining

917M0075C Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 8-10

[Article by M. V. Landau, L. N. Alekseyenko, L. I. Nikulina et al.; All-Union Scientific Research Institute of Petroleum Refining]

UDC 665.654.2.66.097.3+661.183.6

[Abstract] A 2-stage scheme of hydrorefining secondary distillates involved hydrogenation of diene and partial hydrogenation of monoolefin hydrocarbons of the raw material at the 1st stage and hydrorefining of the prepared hydrogenate and prehydrogenation of the monoolefin hydrocarbons at the 2d stage. Since industrial catalysts were ineffective, special catalysts were developed for the 1st and 2d stages of the process. Catalyst IP-70 was developed and ensured, at the 1st stage of the process, refining of secondary distillates with the required degree of hydration of di- and monoolefin hydrocarbons. Catalyst GDS-1, which has high hydrodesulfurization activity and adequate hydration activity for removing monoolefin hydrocarbons, was tested at the 2d stage. GDS-1 catalysts exceeded the desulfurization activty of Soviet catalysts and equalled that of its world analog. It exceeded the other catalysts in hydrogenating activity, which permitted a significant decrease of monoolefin hydrocarbons in the product. The developed catalysts were tested on micropilot devices for 5000 hours. They operated stably without decreasing the level of activity (depth of hydrogenation of olefin hydrocarbons - 99 percent and degree of desulfurization - 98 percent). This justified the use of the developed system of catalysts when refining secondary forms of raw material. Figures 2; references 3 (Russian).

Promising Catalysts of Hydrocarbons Conversion Processes

917M0075D Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 10-11

[Article by B. B. Zharkov, V. Yu. Georgiyevskiy, B. V. Krasiy et al.; Petroleum Processing Association "Lenneftekhim"]

UDC 66.097:665.6

[Abstract] Some new catalysts for conversion of hydrocarbons, developed at the petroleum processing association "Lenneftekhim", were discussed briefly. Reforming catalysts discussed include: a spherical catalyst for installations with continuous regeneration, a catalyst with a reduced level of platinum and a family of spherical catalysts produced by a beading method. Other catalysts discussed include: a catalyst of dehydrogenation of higher paraffins, DP-82, and a catalyst of dehydrogenation of C_3-C_5 paraffins. Modernization of the equipment of catalyst shops is a prerequisite to organization of industrial production of these catalysts. References 2; 1 Russian; 1 Western.

Sulfur-resistant Catalysts of Deep Hydrogenation For Producing White Oils

917M0075E Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 11-14

[Article by M. V. Landau, I. I. Zadko, V. Z. Zlotnikov et al.; All-Union Scientific Research Institute of Petroleum Production]

UDC 665.654.2.66.097.3+661.183.6

[Abstract] Sulfur-resistant catalysts of hydrogenation make it possible to improve the technology of production of high-purity white oils. Two schemes of production were described and discussed briefly: hydrogenation of the base oils in 1 stage on catalyst NVS-30 with subsequent fractionation and low-temperature deparaffinization and hydrogenation of base oils sequentially on catalysts GO-38A and NMG-60Ts. The 2d scheme proved to be more effective since it includes double low-temperature deparaffinization of the viscous oil distillate, the 2d stage of which is impeded by the minimal quantity of slack wax, which complicates filtration of the oil solution. Products produced by use of catalysts GO-38A and NMG-60Ts met the All-Union State Standard for vaseline and perfume oils. The processes proved to be as effective as similar processes used abroad. References 8: 5 Russian; 3 Western.

Bifunctional Catalysts For Production of Transformer Oil

917M0075F Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 14-15

[Article by O. D. Konovalchikov, L. L. Freyman, L. D. Konovalchikov et al.; All-Union Scientific Research Institute of Petroleum Production, Industrial Association "Angarsknefteorgsintez"]

UDC 665.637.6.092.5

[Abstract] Production of bifunctional catalysts which make possible simultaneous hydroparaffinization and hydrorefining of raw material for production of low-viscosity base transformer oil from secondary and straight-through oil distillate were described and discussed. Catalyst BFK-53 was developed for production of transformer oil from Baku petroleums. Catalyst BFK-53K was developed to increase thermooxidative stability of special-purpose products, produced on bifunctional catalysts. It increased thermoxidative stability by one order of magnitude. The bifunctional catalysts produced may be used to create new promising processes for one-stage production of transformer oil from different kinds of raw material and greatly expand reserves of its production. References 2 (Russian).

Bifunctional Catalysts For Regenerating Spent Oils

917M0075G Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 15-16

[Article by O. D. Konovalchikov, L. L. Freyman, L. D. Konovalchikov et al.; All-Union Scientific Research Institute of Petroleum Processing]

UDC 665.637.6.092.5

[Abstract] The Ryazan Experimental Plant of the All-Union Scientific Research Institute of Petroleum Processing has developed a technology of industrial regeneration of spent motor oils using bifunctional catalysts [BFK] of different composition with different hydrogenating components. At 355°C for a period of 2200 hours, one of the catalysts, BFK-18, provided a product with pour point of minus 17 - minus 19°C and color which more than meets the demands for motor oil. Tests of the catalyst on other forms of raw material and on primary raw material showed complete and constant preservation of quality of the product throughout tests lasting 4000 hours of operation of the catalyst. This justified recommendation of the BFK-18 catalysts for use in regenerating spent motor oils. References 4 (Russian).

Industrial Zeolite-containing Catalysts for Hydrorefining Petroleum Fractions

917M0075H Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 17-20

[Article by Ye. D. Radchenko, R. R. Aliyev, V. A. Vyazkov and B. K. Nefedov; All-Union Scientific Research Institute of Petroleum Processing; Industrial Association "Kuybyshevnefteorgsintez"]

UDC 665.658+665.753.4

[Abstract] Series GKD catalysts for hydrorefining petroleum fractions were produced by precipitation and modification of active aluminum oxide, preparation of the zeolite components, production of the aluminozeolite carrier and activation of it by a solution of salts of active metals and drying and calcination of the catalyst granules. Catalyst GKD-202 ensured adequate degree of removal of sulfur compounds at temperatures 10-20° below those of domestic industrial catalysts. Its intergeneration period is basically 2 years and the overall course of service is at least 6 years. Finely granulated zeolite-containing catalyst GKD-205 ensured a 90 percent degree of removal of sulfur compounds from vacuum distillates. An advantage of this catalyst is the possibility of combining processes of hydropurification and hydrocracking due to the presence of the zeolite component. A technology of preparation of catalyst GKD-202P, including preparation of the aluminsilicate carrier and mixing it with a molybdenum salts solution, drying and calcining the carrier, impregnating the carrier with a cobalt salt solution in the presence of phosphoric acid and drying the catalyst produced a product which can reduce by 30 percent the expenditure of scarce salts of the metals, decrease nitrose gases emission, eliminate work with large volumes of solutions of salts of the metals and intensify hydrorefining of diesel fuel by decreasing the temperature of the process by 20-30°. Use of the GKD series catalysts increased the productivity of hydrorefining devices by 10-15 percent, decreased the sulfur content in the hydrogenated product by 15-20 percent (relative) and provided a fuel and energy savings

of 10-15 percent (relative). Functional properties of ANM-compositions can be changed by introduction of high-silicon zeolite TsVM. Samples of KD-3P and GKD-3N synthesized in this manner have adequately high isomerizing properties. Figures 4; references 5 (Russian).

Modification of KMTsU-B Catalyst to Improve Cracking Indicators of Vacuum Distillate

917M0075I Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 20-22

[Article by R. R. Aliyev, T. S. Kostromina, T. L. Gasanov et al.; All-Union Scientific Research Institute of Petroleum Processing; Novo-Baku Petroleum Processing Plant imeni Vladimir Ilich]

UDC 665.664.2.06

[Abstract] A study of the effect of kaolin in KMTsU catalyst on its physico-chemical properties limited the quantity of kaolin introduced to 15 percent (mass). With this quantity of kaolin, catalytic activity remained practically unchanged but a decrease of catalyst surface and formation of wide pores occurred. Evidently, this change of porous structure of the matrix favored an increase of the metal-resistance of the catalyst, that is, its capacity to resist the poisonous effect of metals (especially nickel and vanadium) present in the raw material. Laboratory tests showed the metal-resistance of catalyst samples in a model reaction of n-hexadane cracking after artificial deactivation by nickel and vanadium from appropriate salt solutions. After introduction of 10-15 percent (mass) of kaolin, the catalytic activity of the catalyst remained high according to gasoline yield. All samples displayed increased bulk density after calcination in a "fluidized bed" with both 10 percent and 15 percent kaolin content. The strength of all samples decreased after introduction of kaolin but this decrease was insignificant after use of 10 percent of kaolin. The studies showed the possibility of making industrial batches of KMTsU-B catalyst with introduction of kaolin. The indicators of the catalyst corresponded to the norms of technical conditions for catalyst cracking. Use of kaolin increased the catalyst shop productivity by replacing some of the aluminosilicate hydrogel matrix; reducing the amount of reagents required and the amount of waste water. Figure 1; references 4 (Russian).

Status of Production of Platinum-containing Catalysts

917M0075J Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 22-23

[Article by B. V. Krasiy, T. M. Klimenko, D. K. Krachilov and I. I. Sorokin; Petroleum Processing Association "Lenneftekhim"]

UDC 66.097:665.6

[Abstract] Basic trends of improving Soviet reforming catalysts include: transition from fluoridated to chlorinated catalysts, replacement of monometallic compositions by polymetallic compositions, reduction of platinum content, introduction of procedures for dispersion of platinum and development of catalysts of different composition for different reactors of reforming equipment. Great attention is being given to selection of carriers to ensure an optimal combination of metallic and acid functions of the catalyst and the most complete use of the potential of each catalytic composition. The lack of modern equipment is impeding improvement of platinum-containing catalysts. Only 4 of the many catalysts developed at the Petroleum Processing Association "Lenneftekhum" are being introduced. Equipment necessary to improve the quality of platinum-containing catalysts and increase the assortment was listed and discussed. The need for improvement of technology to produce carriers of higher purity was discussed. Development of production of platinum-containing catalysts is being delayed by the lag in chemical machine construction and by the faulty practice of assessing the effectiveness of catalysts production. References 3 (Russian).

Industrial Experience in Activating Reforming Catalysts

917M0075K Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 p 23

[Article by V. N. Mozhayko, A. Z. Rubinov and R. N. Shapiro; Petroleum Processing Association "Lenneftekhim"]

UDC 66.097.3+665.644

[Abstract] Data obtained by the Petroleum Processing Association "Lenneftekhim" showed that hydroxychlorination of catalyst KR-110 increased the toluene yield during heptane reforming from 44 percent to 54 percent. The failure of attempts at oxidative activation of fresh charges of polymetallic reforming catalysts under industrial conditions has been attributed to the use of inadequately purified gases, failure to consider adequately conditions before use of the apparatus, disturbances of the temperature regime of activation and shortage of oxygen in the system. The experience of using catalyst KR-110 at the Kremenchug Petroleum Processing Plant included observation of it during storage for more than 1 year, analysis of individual batches of it and activity at different temperatures. The study showed the excellent activity of the catalyst. Successful activation of the catalyst required a sufficient concentration of oxygen in the circulating gas and chlorine at the intake into the catalyst layer, quality control of nitrogen circulating in the system and analysis of preceding operation of the equipment. Overshoot of chlorine during its intense feeding must be avoided to prevent excessive corrosion of the equipment. The effectiveness of activation depended upon the type and state of the catalyst at the

moment of loading and upon the humidity of the system in the period of activation. References 3 (Russian).

New Impregnation Technology in Production of Applied Catalysts

917M0075L Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 24-25

[Article by V. K. Duplyakin, A. S. Belyy, A. V. Rodionov and V. S. Alfeyev; Omsk Department of the Institute of Catalysis; USSR AAcademy of Sciences; Siberian Department]

[Abstract] An industrial impregnation technology which matches the quality of that of laboratory samples to a greater degree than existing technologies was described and discussed. This technology also gives better results than usual on a research scale during development of new catalysts. The technological scheme of the circulation impregnation unit was illustrated and described. The technology includes processing the carrier by R substances (Br^- Cl^-, CNS^- in order to create adsorption centers whose nature determine the mechanism of fixing and localizing the active component precursor; performing sorption under gradient-free conditions created by circulation of the impregnated solution through the stationary layer of the carrier and regulating the rate of the sorption processes and distribution of the substances in the course of impregnation by maintaining the selected frequency of circulation and concentration of the substance applied and controllinng input of this substance into the circulation contour. The new impregnation technology makes it possible to create automatic equipment with high unit productivity of the equipment, to provide waste-free productionn by expensive active components; to increase labor productivity, to improve technical characteristics of catalysts and to provide reproducibility of laboratory samples and homogeneity of output. Production of aluminosilicate reforming catalysts by the new technology ensured increase of the octane number of gasoline by 4-5 points and yield by 1 percent by reducing wastes; the absence of spent platinum-containing solutions and a 2-fold reduction in platinum loss due to multiple use of the impregnation solutions; elimination of heavy physical labor and pollution of the work area by hydrogen sulfide. Figures 2; references 6: 2 Russian; 4 Western.

Simplification of Impregnation Technology During Production of Hydrorefining Catalysts

917M0075M Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 p 26

[Article by N. R. Gazimzyanov, I. I. Zadko, S. L. Mund and A. N. Startsev; Elektrogorsk Branch; All-Union Scientific Research Institute of Petroleum Processing; Institute of Catalysis; USSR Academy of Sciences; Siberian Department]

[Abstract] Creation of highly-active petroleum distillates hydrorefining catalysts by relatively simple and economical technologies by methods of 1-stage and 2-stage impregnation involved development, at the Electrogorsk Branch of the All-Union Scientific Research Institute of Petroleum Processing with collaboration of the Institute of Catalysis, USSR Academy of Sciences, Siberian Department, of an origina' technology of 1-stage impregnation of a carrier by a sc'ution containing ammonium paramolybdate, Co (Ni) salt and a stabilizer. A table compared catalysts prepared by this method to some industrial catalysts. The technology contained no stage of intermediate tempering after Mo application but the Mo was applied in the presence of an activator. The technology improved the technical and economic indicators of catalysts production in comparison with those of traditional impregnation technologies. Catalysts produced by this method were superior to existing industrial catalysts in hydrodesulfurization activity. References 9: 8 Russian; 1 Western.

Separation of Suspensions and Washing NaX Zeolite on Synthetic Filter Cloths in Vacuum

917M0075N Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 27-28

[Article by Yu. S. Sivtsev, Ye. M. Savin, G. A. Videneyev et al.; Groznia Scientific Research Institute; Ishimbayskiy Petroleum Processing Plant]

UDC 611.183.6.05

[Abstract] A study of separation of suspensions and washing NaX zeolite on synthetic filter cloths, produced by Soviet industry, in a vacuum, was performed to develop recommendations for optimizing operations of the filtration unit in zeolite production at Ishimbayskiy Petroleum Processing Plant. Studies were performed on a laboratory vacuum filtration installation (illustrated in text) for separation of NaX zeolite suspensions in mother liquid, selected from an industrial installation. Filter fabrics A, B, V, and G served as filtering materials. They were compared with cotton belting duck (GOST 332-69). Delaying capacity of the filter fabrics was AVB=G=belting. The rate of washing NaX zeolite lumps was approximately the same for all fabrics and was about half of the rate of filtration. The filter cloths ranked BV=GAbelting in separating the sedimentation. During use of fabrics A and B, productivity of a belt vacuum-filter was 450-540 kg/(m^3xhr) for sedimentation at humidity of 45-48 and 50-52 (mass) percent, respectively, which is almost twice as high as that from use of belting. Filtering and washing zeolites on vacuum filters (belt or drum) proved to be more effective than the use of filter presses. Figures 3; references 3 (Russian).

Hydroclassification Of Hydrogel of Aluminosilicate Adsorbent on Hydraulic Semisubmersible Vibrating Screen [GVP]

917M0075O Moscow KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 28-30

[Article by V. P. Sokolov, V. N. Golovanov, N. M. Baranova and L. A. Kudrina; All-Union Scientific Research Institute of Petroleum Processing]

UDC 66.047

[Abstract] Determination of optimal parameters of hydroclassification of fine-spherical hydrogel of an adsorbent and assessment of the possibility of a GVP type screen for hydroclassification involved study on the model of a GVP screen, performed on a scale of 1:6.25. The layout of the hydroclassification unit was illustrated and described. Each experiment on hydroclassification included control of feed of the initial material onto the loading part of the sieve (specific productivity) and the content in it of absolutely dry substance, the expenditure of water on dilution of the hydrogel suspension, time of operation, granulometric composition of raw material, oversize and undersize products and yield of products. Mathematical processing of experimental data provided equations which connect maximal effectiveness of separation, yield of oversize product, specific productivity with the content of the calculated fine fraction at the 1st stage of hydroclassification. These equations permitted calculation of optimal parameters of hydroclassification at the 1st stage for a fixed granulometric composition of the initial product. The experimental and calculated dependences obtained indicated the advisabilty of 2-stage hydroclassification of hydrogel of fine-spherical aluminosilicate adsorbent with the aid of the semisubmersible screen and made it possible to find optimal parameters of the process. Figures 4; references 3 (Russian).

Drying Fine-spherical Aluminosilicate Adsorbent

917M0075P KHIMIYA I TEKHNOLOGIYA TOPLIV I MASEL in Russian No 1, Jan 1991 pp 30-31

[Article by V. P. Sokolov, V. N. Golovanov and L. A. Kudrina; All-Union Scientific Research Institute of Petroleum Processing]

UDC 66.047

[Abstract] A study of the process of drying fine-spherical aluminosilicate adsorbent and selection, with consideration of its physico-chemical properties, of an efficient method and rational drying regime which ensures preservation of high strength and quality of the adsorbent was described and discussed. Temperature had very little effect on packing of the hydrogel particles during drying. Abrasion of the particles in the drying process was relatively small and practically constant. Strength of the material decreased considerably with the increase of moisture content in the drying process. Use of equipment which provides intense mixing was recommended for drying hydrogel of fine-spherical aluminosilicate adsorbent. The most efficient method of drying the adsorbent required stages of preparation of the raw material, hydroclassification and mechanical dehydration and a stage of gentle convective or combined drying with continuous mixing of the layer of material. This method provided a high yield and good quality of the product with minimal energy expenditures. Figures 4; references 4 (Russian).

Catalytic Action of Solid Surfaces Based on Kinetic Data

917M0118G Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 91 pp 71-74

[Article by M. I. Temkin]

UDC 097.1:541.128

[Abstract] This review type paper was presented at the Fifth All Union Conference on Mechanisms of Catalytic Reactions in Moscow, 14 May 1990. An attempt was made to answer the puzzling question why does a foreign substance accelerate the reactions. According to Ostwald, catalysis is a phenomenon of chemical kinetics, yet it is not being investigated as such. The catalytic action is directly related to lowering energy of activation of chemical reactions. It is a process which occurs in stages: instead of one slow reaction, several fast ones take place. Several reactions were analyzed as models for the catalytic process: production of hydrogen by reaction of CO with steam, formation of steam from hydrogen and oxygen over platinum, formation of acetaldehyde from acetylene, addition of butadiene- 1,3 to maleic anhydride, etc. It was concluded that the catalytic action on the surface of solids is the result of the participation of adsorbed particles with high degree of ionic characteristics in the reaction, or formation of intermediate substances, transition states, aromatic cycles, etc. which contain the surface atoms of the catalyst.

Investigation of Silver Catalyst Performance in Oxidation of Methanol

917M0118H Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 91 pp 75-76

[Article by A. A. Sakharov, A. N. Pestryakov, N. V. Sakharova, V. N. Kurina, A. N. Devochkin]

UDC 661.727.1:66;097.3

[Abstract] The goal of this work was to compare performance of two types of silver catalysts used in oxidation of methanol to formaldehyde: solid silver (1-2 mm crystals) and silver deposited on pumice (40%). Reaction conditions resembled closely the industrial process. Two

procedures were tested: a rigid and a soft one. The rigid procedure was run under the following conditions: temperature: 600-700° C, O_2:CH_3OH ratio = 0.3-0.35, concentration of methanol in the starting mixture 70- 80%, reactor load 100-120 g/cm^{2}xhr; the soft process used 500-600° C, oxygen:methanol ratio 0.2-0.25, reactor load 150-180 g/cm^{2}xhr and pure methanol. Analysis of the data led to the conclusion that on new plants with modern technological equipment where the process can be run a long time without breakdown, the solid silver catalyst should be used. In the older plants which do no have rectification columns and the equipment is often down for repairs, the traditional deposited silver catalyst should be used. Tables 3; references: 6 (Russian, 2 by Western authors).

The Effect That the Conditions of Reducing Palladium-Containing Zeolite Catalysts Have on the Indicators of Alkylation of Isobutane by Butenes

917M0131A Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 20 Nov 90) pp 11-14

[Article by V.I. Kashkovskiy, V.A. Bortyshevskiy, P.N. Galich, and K.I. Patrilyak, Institute of Bioorganic Chemistry and Petrochemistry, UkSSR Academy of Sciences, Kiev]

UDC 665.652.4:547.214:546.11

[Abstract] The activity of metal zeolite catalysts is largely determined by the conditions under which the metal is reduced. In view of this fact, the authors of the study reported herein studied the effect that the conditions under which a palladium-modified zeolite catalyst is reduced exert on the indicators of the alkylation of isobutane by butenes. A polycation decationized zeolite of the type X (HLaCaNaX) with an optimal cation makeup was used to obtain the metal zeolite catalyst. The palladium modification was performed as described elsewhere, and the reduction temperature was varied between 353 and 653 K at intervals of 100 K. After the catalyst was heat-activated and cooled to the specified temperature, hydrogen was fed through the reactor at a rate of 2 to 3 l/h for 2 hours. The studies were conducted at a partial hydrogen pressure of 0.1 MPa. It was found that the tendency toward a decrease in catalyst activity and selectivity is less pronounced at lower temperatures. Catalyst that was first wet with isobutane and then treated with hydrogen at 353 K was found to possess the best set of catalytic properties. Overall, conducting alkylation on a modified palladium catalyst proved to be less effective because crude butenes are involved in the hydrogenation process. In view of this, systems affording the possibility of selective hydrogenation of the intermediate structures while preserving the catalyst's alkylating function should prove interesting. Figures 2, table 1; references 7: 3 Russian, 4 Western.

Principal Directions for Utilization of Mineral Fertilizer Manufacturing Waste Products

917M0118F Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 91 pp 122-124

[Article by I. I. Sterzhneva, V. S. Petrova, T. L. Didenko, L. F. Kuznetsova]

UDC 631.82.004.82

[Abstract] A data bank was established on industrial waste products, showing that annually the industrial production yields 60.6 million tons of solid wastes and 244.7 million m^3 are recycled. In addition to the above, mining operations yield 162.7 million m^3 of dirt which is reused in soil cultivation (95%). Most of the recycled wastes (70%) are reused on the original production sites. Significant levels of the waste material are reused in agriculture, in production of construction materials and in paints. Yet all of this amounts to only 20% of the available resources; the rest needs to be stored on the ground, buried in the soil or washed out into the water system. There are many reasons for this sorry situation, mostly cost effectiveness of the recycling and lack of the transportation network to move the waste from the site of origin to the reprocessing plants. Some proposals were made to solve this problem: establishment of control measures at the plants, better information network on available waste resources, better research on reutilization, development of logistics for delivery of the waste material to recycling sites and budgetary considerations for such operations. Tables 2; references: 9 (Russian).

Vortical Cooling Apparatus as a Drier of Compressed Air

917M0119A Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 91 pp 16-17

[Article by V. N. Mikhushkin]

UDC 621.578:66.074.31:661.92-403

[Abstract] The quality of compressed air widely used in pneumatic automation and processing equipment is determined by the amount of impurities in it, especially water vapor. Increased moisture content in compressed air results in lowered effectiveness, leads to corrosion of the equipment and may cause serious accidents. A vortical cooling apparatus was developed with double circulation of hot steam which made it possible to cool and dry the compressed air in a single operation. After splitting the stream of compressed gas in a vortex chamber into a hot and a cold portion, the condensed moisture and ice crystals obtained with lowering of the temperature are pushed out by centrifugal forces towards the periphery, where they are partially evaporated at higher temperature prevalent there. At that stage the relative moisture content of the hot air stream is increased and then, while passing through a heat exchanger, water is condensed out. Thus dried, compressed air is passed through another cycle of energy separation; the stream next to the axle is dried due to the cooling process and because it is formed from an already dried hot stream of air. Thermodynamic effectiveness of vortical cooling apparatus with a double circulating stream is 22-25% depending on the pressure at the inlet. Figures 2; references: 4 (Russian).

Cryoscoping Problems at a Temperature Level Below 2 K. Communication 1. Real Requirements of Cooling at 1.8-2 K Level

917M0119B Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 91 pp 20-22

[Article by I. F. Kuzmenko, Candidate of Technical Sciences]

UDC 536.581.3:621.592

[Abstract] The need to cool materials down to 1.8-2 K resulted from the successes and prospective of the developments in high energy physics, electronics and space technology. Review of current information sources showed at a minimum four large scientific-technical projects in which liquid helium is used most widely: proton-proton colliders with magnetic induction of 10 Tl, thermonuclear reactors with an induction of 24 Tl, super conducting magnetic systems for storage and accumulation of energy, particle accelerators with ultra high frequency resonators and electronic technology for terrestrial and space utilization. Thus, the development of cryogenic technology generated the need for construction of novel refrigerators which will be the topic for the second part of the paper. References 26: 1 Russian, 25 Western.

Calculation of Dynamic Operating Conditions of Cryostating Superconducting Apparatus

917M0119C Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 91 pp 22-24

[Article by S. P. Gorbachev, Doctor of Technical Sciences; S. D. Ladokhin, Candidate of Technical Sciences]

UDC 536.483:621.594-71

[Abstract] Regular impulse heat generation is a characteristic property of the dynamic process of the cooling systems of superconducting elements. At the present time no unified answer exists in the literature on the question of how the helium passed into the cooling channels affects the heat stability of the superconductor towards prolonged heat impulses. A theoretical analysis of the dynamic processes of the cooling systems of superconductors was performed. On the basis of the analytical functions obtained, it became possible to

determine heat stability of current carrying elements towards long impulse heat generations, input repetition of the heat impulses in relationship to the time of a complete replacement of helium in the channels after such impulses, and the reaction of the objects being cooled to helium units. Figures 2; references: 8 (Russian).

Semiautomated Spherical Lathe Unit of High Accuracy for Machining Ball Faucet Components

917M0119D Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 2, Feb 91 pp 34-35

[Article by V. V. Zimin]

UDC 621.941.24:621.646.616

[Abstract] Western companies produce spherical components for ball faucets with curvature accuracy of a few micrometers. A claim was made that such an accuracy was now achievable on domestically produced Soviet lathes. As an example, the semiautomatic stand LS 115 was described which makes it possible to obtain ball faucets with D_y = 20-100 mm and sphere form accuracy of 0.02 mm. Their productivity ranges from 30-75 units per hr. These products are now being sold abroad for hard currency. Figures 3; references: 1 (Russian).

Recovering Chromium-Containing Hydroxide Sediments in the Production of Silicate Pigments

917M0131B Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 1 Oct 90) pp 15-17

[Article by N.T. Okopnaya, A.B. Kliger, K.R. Zbigli, and F.S. Peres, Chemistry Institute, Moldovan Academy of Sciences, Kishinev]

UDC 675.043.83.046.14

[Abstract] Many silicates are capable of isomorphous substitutions of metal ions in their crystal lattice and formation of solid solutions with different chemical makeups. This makes it possible to produce pigments by replacing calcium with "colored" ions in the lattices of the respective silicates. The authors of the study reported herein examined the possibility of producing silicate pigments by using chromium hydroxide separated from the spent electrolyte of baths used to passivate components and from the silica lime of Moldova's deposits. The resultant charge was heat-treated at temperatures ranging from 1,250 to 1,450°C. X-ray crystallographic analysis and physicochemical studies established that the washing out of Cr (VI) from the silicate pigments by water is the result of the formation of $CaCrO_4$ phases in them. The transition of calcium chromate into uvarovite at 1,400°C results in a significant reduction in the washout of Cr (VI) from the pigments. At 1,450°C the uvarovite begins to break down. This phenomenon is accompanied by the formation of Cr_2O_3 and probably some amount of CrO_3, which in turn causes washout of the Cr (VI) to increase. Consequently the minimal washout of Cr (VI) ions from the pigments is achieved when their uvarovite content is at its maximum. This is achieved by heat-treating the siliceous lime mixture with 0.1 to 0.3 moles chromium hydroxide at 1,400°C. Figure 1, tables 3; references 2 (Russian).

The Effect of Cr_2O_3 on the Mineralogic Makeup of Clinker and on the Properties of Cement

917M0131C Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 17 Jul 90) pp 18-20

[Article by Ye.A. Myasnikova, O.P. Shestakova, Ye.A. Podlesnaya, and L.D. Abakumova, Kiev Polytechnic Institute]

UDC 666.945

[Abstract] The catalytic and modifying effect of Cr_2O_3 on the clinker formation process has been found to depend on the mineralogic makeup of the raw material mixture. Various researchers have determined the optimal amount of chromium oxide additive to be between 0.1 and 5%. The authors of the study reported herein examined the effect of chromium oxide on the sintering of high-silica (KH = 0.8) charges of chalk and perlite when added in amounts of 0.1, 0.5, 1.0, and 2.0%. The chalk and perlite charge studied had the following mineralogic makeup (% by weight): C_3S = 40.26, C_2S = 45.89, C_3A, 11.13, and C_4AF = 2.72. Briquettes measuring 5 x 5 x 1.2 cm that had been pressed at a pressure of 15 MPa were annealed at 1,450°C and held for 30 minutes. The makeup of the annealing products was studied by x-ray crystallography. The amount of additive used was found to affect both the clinker's content of the minerals alite, belite, and tricalcium aluminate and to change their structure. Increasing the amount of additive used from 0.1 to 2% slowed the cements' hydration rate and reduced their strength. According to the research conducted, the optimal amount of Cr_2O_3 additive is 0.1%. Figures 3, table 1; references 5: 2 Russian, 3 Western.

A Study of the Pressability of Finely Dispersed Potassium Chloride

917M0131H Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 pp 57-61

[Article by F.M. Kuznetsov, V.A. Volkov, F.V. Povar, and G.I. Kashina]

UDC 661.832.32.099.21

[Abstract] Dedusting is one effective method of improving the transport and technological indicators of fine-grained potassium fertilizers. The use of dedusting

as a way of improving the quality of fine-grained potassium chloride is being held up by a lack of proven methods of recovering powdered potassium chloride. In an attempt to develop such a method, the authors of the study reported herein conducted laboratory tests to determine the feasibility of press granulation of powdered potassium chloride. They discovered that the method was indeed feasible when the material was at a temperature of about 150°C and a pressing pressure of 200 MPa was used. Examination of selected plasticizers, i.e., NH_4NO_3, $(NH_4)_2SO_4$, and $CO(NH_2)_2$, on the process of pressing potassium chloride revealed that such additives result in granules that remain stable when the material is at a low temperature. This positive effect is attributed to fact that the additives increase the number and area of the individual contacts between particles. No fundamental differences between the pressability of powdered and common KCl were found. High pressing temperature and the use of plasticizing additives were each found to result in stable granules. Figures 5, table 1; references 10 (Russian).

Industrial Production Method of Tetrahydrophtallic Anhydride

917M0144A Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 136-138

[Article by V. I. Zetkin, V. V. Goryachev]

UDC 661.7:547.595.3

[Abstract] Tetrahydrophtallic anhydride (THPA) is used as an intermediate product in production of anticorrosive polyester resins stable in air which then are used in manufacturing of lacquers. The single reliable method of industrial preparation of THPA is based on condensation of maleic anhydride with butadiene. The following appear to be the optimal reaction conditions for its preparation: temperature 55-120°C, the rate of butadiene addition should be equal to its consumption; iron ions should be avoided at all costs, so the reactor and the stirrer should be made of enamel covered material; polymerization inhibitor such as 0.01% hydroquinone should be added to the reaction mixture. The only side reaction is the polymerization of butadiene to the di-, tri-, and tetramers. A new modification for industrial production of THPA was proposed. Gaseous butadiene-1,3 is added with stirring to molten maleic anhydride at 55-120°C containing 0.005-0.01% hydroquinone, tert-butylpyrocatechol or some other polymerization inhibitor. The yield of the product is 98%, requiring no further purification. Table 1; references 11: 4 Russian (4 by Western authors), 7 Western.

Extraction of low Molecular Weight C_1- C_5 Fatty Acids From Their Aqueous Solutions

917M0144B Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 141-143

[Article by B. K. Nuriyev, I. A. Akhmedova]

UDC 66.004.82:661.73

[Abstract] Considerable quantities of C_1- C_5 fatty acids are formed during liquid phase air oxidation of hydrocarbons. During this process effluents are formed containing 20-30% oxygenated compounds among which 75-85% are the acids. Extraction of these acids was investigated in a laboratory setup using isobutyl formate as the reagent forming azeotropic mixtures for distillation over a 9 plate column. The optimal ratio of isobutyl formate to the removed water was 4.3 to 1 assuring a 99.8% extraction of acids from the effluent. Chromatographic analysis showed that the fatty acid concentrate consists primarily of the acetic and formic acids. The water content in these acids is 0.4%. These laboratory results were then repeated satisfactorily on a pilot plant scale. This method is applicable to any concentration of fatty acids in water. Figure 1; tables 2; references: 9 (Russian, 1 by Western authors).

Production of Aluminum Hydroxy Chloride and its use in Regeneration of Etching Solutions

917M0144E Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 163-164

[Article by V. I. Larin, T. S. Lukashchuk, L. I. Chekanova]

UDC 621.794.48

[Abstract] Various coagulants are used to purify water from coarse dispersed particles and colloids. One of the most promising agents for this purpose is aluminum hydroxy chloride; it requires less HCl, it does not affect the salt content in purified water and practically has no effect on pH. The available methods for syn- thesis of aluminum hydroxy chloride are non-economical. During regeneration of alkaline solutions used in etching of aluminum,, aluminum hydroxide is obtained as a byproduct and it can be used in synthesis of aluminum hydroxy chloride by the newly developed method. $Al(OH)_3$ was obtained by reacting the aluminum solution in NaOH with hydrochloric acid. The purified $Al(OH)_3$ was then dissolved by refluxing in HCl at 90-95°C to yield the $Al_2(OH)_5Cl$. The experimental results showed that the aluminum hydroxy chloride obtained may be used as the precipitating reagent for aluminum hydroxide in spent etching solutions. Figure 1; table 1; references: 9 (Russian).

Use of Granulated Phosphogypsum in Production of Cement

917M0144G Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 167-169

[Article by N. A. Kolev (NRB), Yu. G. Meshcheryakov]

UDC 666.94:691.33

[Abstract] In order to be able to use phosphogypsum in production of cement, it must be first dried and granulated. Because of the cost of these operations phosphogypsum cannot compete with natural gypsum rock. In addition the cohesion of granulated phosphogypsum is weak. The strength of phosphogypsum granules was shown to be a function of its moisture content, duration of its treatment and the drying procedure. Careful analysis of these functions led to development of a methodology for processing phosphogypsum so that it could be used instead of the natural rock. It was established that addition of lime and treatment of phosphogypsum on crusher rolls accelerated its neutralization process and shortened the drying period. Field tests showed that substitution of the natural rock by phosphogypsum granules resulted in somewhat weaker cement during the early setting period (3-7 days). However, there were some advantages: technological operations were reduced to a minimum, the equipment used was standard, the production was ecologically clean and heat treatment of phosphogypsum was not required. Thus phosphogypsum could compete with the natural gypsum rock. Figures 3; table 1; references: 8 (Russian).

Construction Improvement of Ball-Drum Mills

917M0144H Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 175-178

[Article by V. S. Bogdanov, K. A. Yudin]

UDC 621.926.5.002.237

[Abstract] According to the experts, 25% of the electric energy in industrially developed countries is consumed in milling various materials. The ball-drum mills account for most of this effort and yet their kpd is only 0.1-5% because only 50% of the milling components participate actively in the process. Actually, 50% of the finished product is achieved already in the first chamber and its further passage through the mill leads to agglomeration, aggregation and adherence of the material to the milling components. Since the invention of ball-drum mills in 1858 little innovative construction has been carried out. Recently the gross volume of such mills was increased in some countries but this approach does not solve the problem because it is not cost- effective. Another approach was to replace the ball-drum mills by plate-roller mills. A modification proposed by the authors introduced a longitudinal movement of the milled material along the milling cylinder in addition to the normal vertical rotatory motion. This is achieved by introduction of tilted partitions inside the chambers with perforated diaphragms which permit one- way transport of the milled material. This results in greater productivity at a lower consumption of energy. Figure 1; table 1.

Universal Industrial Liquid Reactor of Continuous Action

917M0144I Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 178-179

[Article by Yu. S. Ivchenko]

UDC 66.023.002.237:66.063.8

[Abstract] An attempt was made to design a universal apparatus capable of modernizing the commercially available units. The new construction optimized the flow of the media being mixed in the apparatus, increased the kpd of the mechanical stirrer, made it possible to convert batch processes to continuous reactions, increased specific yield of the equipment while maintaining improved ecological indices. The design of this new apparatus permits the operator to alter the relationship between centrifugal, radial and axial velocities by changing the level of the filling of the apparatus. Energy dissipation is regulated by varying the output of the unit, so that it can be easily attached to any specific processing component. The reactor consists of two basic units: the upper unit serving as the sedimentation tank and the lower unit serving as the activator. These sections are connected with internal and external flow pipelines. A stirrer is located at the axis. Energy consumption of this apparatus is 40% lower than of the catalog listed equipment, specific volume productivity is 10-20 times higher. Figure 1; references: 3 (Russian).

Cryostatic Problems at Temperatures Below 2 K. Part 2. Analysis of Principal Refrigerator Designs

917M0097A Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 3, Mar 91 pp 16-18

[Article by I. F. Kuzmenko]

UDC 621.592

[Abstract] The lowering of cryostatic temperature from 4.2 K to 1.8 K faces many problems. The equilibrium pressure of helium at 1.8 K is 1.66 KPa. This causes two specific problems. First, the helium vapors must be vacuum pumped from the final cooling stage pressure to atmospheric pressure, and the lost degree of coldness of the return vacuum heat exchangers must be recovered. Also, the high compression needed requires a very large scale multi-stage vacuum system, while the low rate of heat exchange in the vacuum heat exchangers is the main reason for high loss in irreversibility and capital expense. In the present work a review of refrigerator designs covers four known schemes and their variations. Figures 3; references 28: 1 Russian, 27 Western.

Analysis Results of Dynamic Work Conditions of Cryostated Super Conductor Devices

917M0097B Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 3, Mar 91 pp 19-20

[Article by S. P. Gorbachev and S. D. Ladokhin]

UDC 536.483:621.594-71

[Abstract] In a previous work a method was described for calculating the dynamic operating conditions for cryostating super conductor devices with regulated pulsed heat extractions distributed along cooling ducts. In the present work this method was used to compare various cryostatic variants in heat stability (helium above or below the critical point) in regard to heat resistance to the distributed heat pulse, the minimum time between pulses, and fluctuations in consumption of cryogenic agent on exiting the magnetic coils during transition. The analysis demonstrated that cooling super conductor coils with helium below critical pressure makes it possible to raise the maximum allowable value of the heat distribution pulse, provide better cooling at high magnetic fields, and decrease fluctuations in helium consumption during pulsed heat disruptions. Figure 1; references 4 (Russian).

Calculation of Upper and Lower Temperature Limits of Flame Spread of Individual Combustible Fluids

917M0144D Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 150-151

[Article by Ye. R. Nazin, I. V. Karpukhina]

UDC 543.874.001.24

[Abstract] Several methods exist for calculation of the upper (T_u) and lower (T_l) temperature limits of the flame spread of combustible fluids. The formulas are of general character but their use is rather limited because the required data are not available for a number of compounds. New calculation formula was proposed for T_u and T_l based on the number of carbon atoms in the combustible molecule and its boiling point. This formula is applicable to all classes of combustible organic fluids except for silicon-organic compounds. References: 8 (Russian).

Apparatus for Wet Cleaning Off Gases

917M0097E Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 3, Mar 91 pp 26-28

[Article by Yu. N. Levitskiy and A. L. Breytbart]

UDC 66.074

[Abstract] An All-Union scientific and technical seminar on "Application of Wet Type Apparatus for Cleaning Off Gases from Harmful Solid and Gaseous Pollutants" was held recently. Participants included specialists from the leading scientific production organizations, design institutes, and enterprises involved with removing waste gases from the atmosphere. Reports were presented on a variety of subjects relating to wet treatment of off gases and recommendations were made on the further improvement of gas and dust removal methods.

The Problems and Prospects of Reducing Atmospheric Emissions by the Enterprises of the Metallurgical Industry in the Donetsk Region

917M0131I Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 21 Jan 91) pp 96-101

[Article by I.N. Karp, Gas Institute, UkSSR Academy of Sciences, Kiev]

UDC 614.715/.72

[Abstract] Along with power generation and automotive transport, ferrous metallurgy is one of the biggest sources of harmful atmospheric emissions in the Donetsk region. In the past few years, enterprises under the auspices of the Ministry of Ferrous Metallurgy have generated 66.6% of the carbon monoxide, 29.9% of the dust, 19.7% of the sulfur dioxide, and 10.9% of the total emissions from stationary pollution sources. Ferrous metallurgy enterprises also emit hydrocarbons, aldehydes, phenols, fluoride compounds, hydrogen sulfide, and other toxic substances into the atmosphere. The toxins emitted from enterprises of the Donetsk and Lugansk oblasts account for over one-third of the wastes emitted by all of the republic's enterprises combined, and metallurgical enterprises are responsible for half this amount. Many of the strategies that have been proposed to solve the many ecological problems created by the wastes generated by the Donetsk Oblast's metallurgical enterprises are not very realistic. The proposals calling for greater use of catalytic neutralizers, for example, are not feasible in view of the great expense of the palladium that must be used for such neutralizers and because the technologies for wide-scale production and implementation of such technologies have yet to be adequately worked out. One technology that does appear to hold promise is the technology developed by the Gas Institute of the UkSSR Academy of Sciences for indirect radiant heating of metal using flat flame burners and dry scrubbing of the wastes of electroslag remelting in a fluidized bed. Both this technology and the individual sections of a program of action for protecting the Donetsk Oblast's air basin that includes retooling the oblast's metallurgy sector are discussed in detail in this review.

Thermocatalytic Scrubbing of Gases Containing Vapors of Organic Matter

917M0131J Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 22 Oct 90) pp 102-105

[Article by R.Kh. Mukhutdinov and N.A. Samoylov, Ufa Petroleum Institute]

UDC 660.074.48:661.715.7:547.535.1-125

[Abstract] Deep thermocatalytic oxidation of the organic matter contained in off gases is one of the least efficient scrubbing methods. Because of the specifics of thermocatalytic scrubbing, oxidation catalysts must have a high catalytic activity and low cost and must be highly accessible and produced in large volumes. They should also be mutually interchangeable. The interchangeability of oxidation catalysts in thermal-oxidative scrubbing reactors is limited both by the dimensions of the catalyst layers in the catalyst baskets and by the range of temperature conditions that can be achieved in the reactor. Assessing the conditions required for catalyst interchangeability requires information regarding the physicochemical characteristics of the thermocatalytic process (including reaction rate constant and activation energy) that could be used for check calculations. In view of this need, the authors of the study reported herein examined the possibility of interchanging catalysts in processes of thermocatalytic scrubbing of off gases. They present reaction rate constants and activation energies for three typical organic impurities that are subjected to oxidation. They also present recommended temperature conditions for scrubbing air-and-gas mixtures on five catalysts (aluminum-platinum, copper-chromium, zinc-chromium, iron-chromium, and nickel). For the range of high degrees of scrubbing (70 to 80), the zinc-and-chromium catalyst NTK-4 is determined to be preferable to the iron-and-chromium catalyst STK-1-7 (which the authors studied in a previous communication) in view of its lower parametric sensitivity. The authors make a case for selecting specific thermocatalytic scrubbing conditions on the basis of the technical and economic indicators of the given scrubbing unit and the flexibility of its design and technological decisions. Figures 3, tables 2; references 3 (Russian).

Purification Methods of Industrial Effluents From Production of 2,4,6-Trinitrotoluene

917M0144C Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 146-148

[Article by Ye. S. Nazarenko, V. A. Livke, T. I. Ryabukha]

UDC 6662.237.3:628.543

[Abstract] For each ton of 2,4,6-trinitrotoluene (TNT) produced, 80-90 kg of highly toxic nitro compounds are obtained in the effluent. Because of the high volume of this production, the interest in purification of waters and neutralization of the byproducts is very high world-wide. In this paper literature review has been presented of various purification methods. The physical-chemical methods include treatment with surfactants, adsorption on polymers, on activated charcoal, ozonization with UV light, oxidative chlorination, catalytic reduction and membrane filtration. Biological purification methods include treatments with various microorganism cultures: Azobacter agilis, Pseudomonas bacteria, yeasts, Bacillus subtilis, Citrobacter, Bacillus enterobacter, etc. Selection of a particular method depends on specific conditions and availability of equipment and technology on each site. References 39: 15 Russian (4 by Western authors), 24 Western.

Investigation Method for Absorption and Desorption Kinetics of Carbon Dioxide, Hydrogen Sulfide and Mercaptan

917M0144F Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 3, Mar 91 pp 161-163

[Article by S. S. Lysnyak, M. V. Folta]

UDC 66.974.322+66.074.371.+66.074.378

[Abstract] Liquid absorbers recently introduced in purification of gasses can be regenerated after the completion of the process. Purification of gasses and regeneration of the absorber are based on the knowledge of absorption and desorption processes. Data on the solubility of CO_2 and H_2S in ethanolamine are readily available but the information on the kinetics and mechanism of absorption and desorption of these gasses is limited, especially in regards to mercaptan. The kinetics of absorption and desorption of CO_2 and H_2S was investigated on a simplified but reliable equipment. Detailed methodology and the setup diagram were reported. The degree of absorption/desorption was determined with an accuracy of +/-0.01%; the relative error in determination of mercaptan was within 3%. Figures 3, references 3: 2 Russian, 1 Western.

Investigation of Dihydrate-Semihydrate Production Process of H_3PO_4 and α-$CaSO_4x0.5H_2O$

917M0118L Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 91 pp 87-89

[Article by V. I. Gashkova, Ye. N. Desyatnik, B. I. Savinkova, L. N. Glazyrina]

UDC 661.634.23.004.82:661.842.532

[Abstract] The effect of concurrent presence of sulfuric acid and aluminum-fluorine complexes in phosphate solutions on the kinetics of the recrystallization of calcium sulfate dihydrate (CSD) into α-calcium sulfate semihydrate (α-CSS) was investigated along with the morphology of crystals and binding properties of α-CSS precipitates. Kinetic data of the recrystallization of CSD into α-CSS shows two clearly marked areas: in the first the degree of recrystallization and its rate are the functions of the reaction conditions. In the second - the recrystallization rate is constant. The period of phase transition of CSD into CSS is determined by the duration of the first period, i.e. by the quantity of aluminum fluorine complexes in the solution. It was shown that concurrent presence of Al^{3+} and F^- ions in the solution used for recrystallization of CSD into CSS improves the morphology of CSS crystals but prolongs the recrystallization process and decreases the binding properties of α-CSS. Figures 2; references 10: 9 Russian (1 by Western author), 1 Western.

Some Aspects of Hygroscopic Properties of Fertilizers

917M0118M Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 91 pp 89-90

[Article by Z. A. Tikhonovich, N. N. Bogdanova]

UDC 631.812.001.5

[Abstract] A commentary type paper designed to evoke discussion. The term hygroscopic moisture refers to the moisture with no chemical bonding to the material. The principle of relay mechanism of remote activity proposed in earlier work has been suggested to be operational in the concept of hygroscopic moisture. These concepts on the nature of water bonds with solid surfaces could be applied to the salt systems as well. In this fashion it is possible that the effect of surface forces responsible for the anomalous properties of the saturated salt solutions spreads out to considerable volume of the liquid. The system fertilizer-water is much more complicated than the system water-insoluble body- water, since the solution of the solid phase takes place in it. This makes it much more difficult to provide quantitative explanation of the experimental data. Figure 1; references 11: 10 Russian (1 by Western author), 1 Western.

The Effect of Karpatol on the Properties of Mineral Fertilizers

917M0131E Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 30 Dec 88) pp 23-27

[Article by N.P. Krutko, T.A. Zuskova, O.A. Opanasenko, and F.F. Mozheyko, Institute of General and Inorganic Chemistry, BSSR Academy of Sciences, Minsk]

UDC 681.83

[Abstract] At present, plants use between 30 to 60% of the mineral fertilizers applied to them. Increasing this percentage (i.e., increasing the efficiency of mineral fertilizers) is extremely important to the national economy. For this reason, the authors of the study reported herein examined the effect of karpatol [transliteration] additives on the physicochemical characteristics of mineral fertilizers. Specifically, they examined the effect of karpatol on mineral fertilizers' rate of dissolution in water, hygroscopicity, caking, and granule stability. Karpatol, which is a by-product of petrochemical production, is formed when acid tar is neutralized with ammonia and consists of 25% (by weight) alkylarylsulfonates, up to 40% (by weight) unsulfonated oil, and less than 50% (by weight) ammonium sulfate and water. Using karpatol as a conditioning additive in mineral fertilizers was found to significantly improve the fertilizers' physicochemical and agrochemical properties: caking was reduced from 0.12-0.16 to 0-0.014 MPa, the rate of moisture absorption was reduced by 20 to 40%, and granule stability was increased. Agrochemical tests established that treating mineral fertilizers with karpatol increases barley yields by 6.6 to 21.2% when compared with yields obtained by using untreated fertilizers. Figures 5, tables 2; references 5 (Russian).

Method for Calculating Technological Parameters of Industrial Filters

917M0097C Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 3, Mar 91 pp 25-26

[Article by V. P. Kurkin]

UDC 697.942.001.24

[Abstract] The engineering method for computing filtration process parameters is based on theoretical and experimental studies of the process as carried out at the Industrial and Sanitary Purification of Gases SRI, Moscow and its approval for use on industrial filtration equipment. In the present work mathematical formulas are presented for computing dust clogging function and filtration time of industrial filters for gas-dust streams. Figure 1; references 6 (Russian).

Resistance of Manganese and Sulfur Refined Steel 02Kh18N11 to Pitting Corrosion Under Heat Exchange and Solution Flow Conditions

917M0097F Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 3, Mar 91 pp 30-32

[Article by L. P. Lozovatskaya, V. S. Pakhomov, and Ye. Ya. Burian]

UDC 669.182.71:661.871:620.193

[Abstract] One way to increase the pitting resistance of austenitic chrome-nickel steels is by refining out manganese and sulfur to a value at which the product of the [Mn] and [S] concentrations does not exceed their solubility product in solid solution. In the present work a study was made of the resistance of 02Kh18N11 steel to pitting corrosion. This steel has high resistance to intercrystalline corrosion in oxidizing media under flow and heat exchange conditions of solutions containing chlorine ions. Equipment fabricated from this steel is used in the production of dilute nitric acid and ammonium nitrate at high temperatures. However, use of this steel to make water-cooled heat exchangers is limited owing to the possibility of pitting corrosion and subsequent corrosion fracturing of the heat exchange surfaces if chlorine ion contaminated recycled water is used as a coolant. Study of the corrosion resistance of the refined steel demonstrates that it has high resistance to intercrystalline corrosion in oxidizing media, and high resistance to pitting corrosion in aqueous solutions containing chlorine ions. It may thus be recommended for use as a construction material exposed to both media. Figures 2; references 6 (Russian).

Interrelationship of Phase Compsition and Properties of Reinforced Layer, Resulting from Microarc Oxidation of Aluminum Alloys

917M0097H Moscow KHIMICHESKOYE I NEFTYANOYE MASHINOSTROYENIYE in Russian No 3, Mar 91 pp 29-30

[Article by V. A. Fedorov and N. D. Velikoselskaya]

UDC 621.794.61:357.8:669.715

[Abstract] Microarc oxidation imparts a 300-400 micron coating on barrier metals which is firmly attached to the base metal and has high mechanical and frictional properties as well as high heat resistance. This method is presently used to reinforce the surface of almost any aluminum alloy. In the present work a study was made of the phase composition, physical mechanical properties, and relative resistance to wear of coatings obtained by this method. The results indicate that microhardness and tensile strength are not functions of the thickness of the oxidized coating, nor the microarc conditions. X-rays show that the coating has a crystal structure, and that the basic phase composition is modified α- or γ-alumina. The X-rays also showed no change in phase composition of the reinforced coating after abrasive frictional stress. Figure 1; references 4 (Russian).

Corrosion Behavior of Metals in Highly Mineralized Run-off of Aniline Dye Industry

917M0118N Moscow KHIMICHESKAYA PROMYSHLENNOST in Russian No 2, Feb 91 pp 113-116

[Article by T. A. Ostapchuk, I. M. Spiridonova, S. P. Germanova, V. T. Kopylov]

UDC 66.018.8:628.543

[Abstract] Highly mineralized effluents are formed in various chemical processes involved in production of dyes. One of the ways of protecting the environment from these noxious run-offs is to transport the highly mineralized acid effluents to specialized purification sites. Because of their complex composition, it is difficult to select proper construction material for the pipeline for such transport. Results were reported of the determination of corrosion resistance of stainless steel and special alloys used in manufacturing such pipes. Detailed characteristics of the corrosive effect of 19 different effluents on six metals studied were reported. Table 1.

Optimizing the Operating Mode of Adsorption Units To Dry Natural Gas

917M0131F Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 3 Jan 91) pp 35-37

[Article by A.Ye. Vinokur, A.I. Pyatnichko, N.B. Berezovskiy, and D.Ye. Makarovskiy, Gas Institute, UkSSR Academy of Sciences, Kiev]

UDC 665.632.074.31.05

[Abstract] Absorption drying with highly concentrated glycol solutions used as the drying agent is the most popular way of preparing natural gas for transport. In the USSR more than half of all gas shipped is subjected to industrial treatment on integrated gas units based on absorption technology. The technical and economic indicators of the operation of such units can be improved by finding those process parameter values at which the adjusted costs of drying natural gas are at their minimum. Previous works devoted to this topic have attempted to optimize the processes of absorbing moisture from the gas and regenerating the saturated glycol separately. In view of the limitations of this approach, the authors of the study reported herein have proposed a method for selecting the optimal values of the key process parameters of an absorption unit intended to dry natural gas. The method is illustrated by way of the example of a natural gas drying unit with a capacity of 1 million cubic meters per day. They calculate the adjusted costs of drying natural gas given different concentrations of regenerated glycol as a function of the dilution of the initial diethylene glycol solution. The adjusted costs of drying were found to decrease as the concentration of regenerated adsorbent increased. The data obtained when using the proposed model also confirmed that the optimum dilution is greater when the concentration of regenerated adsorbent is higher. The proposed method, which is based on objective economic criteria, may be used with any technology for adsorption dehydration of natural gas. Figures 2.

The Electrochemical Regeneration of Organic Matter-Saturated Activated Charcoals

917M0131G Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 31 08 90) pp 38-41

[Article by I.A. Tarkovskaya, V.Ye. Goba, V.Yu. Atamanyuk, and T.V. Makhnovskaya, Physical Chemistry Institute, UkSSR Academy of Sciences, Kiev]

UDC 541.183.135

[Abstract] Development of new resource-conserving processes is one of the most important problems in chemical technology. In view of the increasing need for adsorbents for the chemical, food, electronics, and other industries, the development of new and efficient methods of regenerating activated charcoals is critical. The authors of the study reported herein therefore examined the electrochemical regeneration of various types of technical-grade and synthetic activated charcoals contaminated with organic matter in processes of cleaning ethyl alcohol and recovering ethyl acetate. BAU, AR-V, AG-3, and Sorbon activated charcoals were used as sample technical-grade activated charcoals, and SKN activated charcoal was used as a representative synthetic activated charcoal. Electrochemical treatment of the activated charcoals in an electrolyte in the form of a mixture of sulfuric acid and hydrogen peroxide was found to result in virtually complete (95 to 100%) regeneration of their absorbency. The best and most stable results were achieved under the following conditions: H_2SO_4 concentration, 4.4 (4 to 5) mol/l; H_2SO_4:H_2O_2 ratio, 3.5:(0.5-1.5); electrode temperature, 80°C; time, 2 hours; and I_a, 45 A/m^2. Although the regeneration of all of the activated charcoals tested was high (between 88 and 100%), it was found to be higher for the SKN activated charcoal (which is highly electroconductive and ordered) than for the technical-grade activated charcoals tested. Tests demonstrated that graphite, lead dioxide, mercury/titanium dioxide, and other electrodes that remain stable in sulfuric acid solutions can also be used under virtually the same conditions. Figure 1, tables 2; references 11: Russian, Western.

Effectiveness of Using Benzene-and-Gas Mixtures as Motor Fuel

917M0131K Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 20 Nov 90) pp 106-109

[Article by G.A. Bykov and A.I. Pyatnichko, Gas Institute, UkSSR Academy of Sciences, Kiev]

UDC 622.691.6:629.114

[Abstract] Oil is currently the main raw material source of motor fuels for internal combustion engines. Efforts to switch to alternative motor fuels are being made worldwide. The huge natural gas reserves of the USSR, its lower recovery costs (compared with oil), and its cleanliness from an ecological standpoint all make natural gas the most promising alternative to oil as a motor fuel in the USSR. About 180,000 motor vehicles have been converted to operate on compressed natural gas, and 280 gas filling compressor stations have been built. The program to switch automotive transport to compressed natural gas has not turned out to be economically justified, however. Compressed gas automobiles have inferior operating indicators and cost more to produce. Other alternative fuels have been suggested as well. These include synthetic gasoline produced from coal, ethanol, methanol, rarefied natural gas, rarefied oil gases, and combined fuel (a mixture of low-octane gasoline and natural gas). The efficiency of these fuels may be compared by using the following formula: $K_{eff} = 2R/(C_{rec}$

+ Z_{use}), where $\Re$ is the vehicle's run on one fueling with alternative fuel referenced to a run on standard gasoline; C_{rec} is the cost of recovering (bringing to market) the raw material plus the costs to transport and process the raw material required to produce 1 ton of alternative fuel referenced to the costs of recovering, transporting, and refining the oil required to produce 1 ton of automotive gasoline; and C_{use} represents the relative costs of using 1 ton of alternative fuel in relation to gasoline (this includes the capital investments required to create fuel distribution systems and fuel vehicles and to create special systems to supply engines with fuel and convert vehicles, as well as the additional investments in the production base of automotive enterprises when alternative fuel is used). Of all of the alternative fuels analyzed by using this equation, only rarefied oil gases (propane-butane) and combined fuel have a relatively high efficiency. The wide-scale use of propane-butane in vehicular transport is not immediately possible, however, in view of the high demand for this fuel for residential heating. The most feasible alternative fuel thus appears to be a combined fuel based on a technology developed by the Gas Institute of the UkSSR Academy of Sciences together with Kiev Polytechnic Institute. The fuel in question is a combination of unleaded oil or gas condensate gasoline (type A=56) with an antidetonation additive of compressed natural gas. The low-octane gasoline and compressed gas are stored in separate tanks on board the automobile. The gas is fed into a gasoline carburetor-mixer in an amount proportional to the engine's load. Series-produced gas cylinder equipment developed by the Gas Institute is used. The efficiency of using this combined fuel is attributable to the low optimum price of low-octane gasoline (60 rubles per ton) and compressed natural gas (65 rubles per 1,000 cubic meters) as well as to the increased payload of a gasoline-and-gas automobile versus a gas-cylinder automobile. Figure 1, tables 3; reference 1 (Russian).

Optical-Mechanical and Sorption Properties of "Reoksan" Film

917M0096A Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 91 pp 10-12

[Article by A. V. Kazannikova and Yu. E. Burunkova]

UDC 768.744.335.448.01:539.3:665.7.035.7

[Abstract] Block polymer "Reoksan", used in optical holography, can also be prepared in film form by pouring the composition over optical glass followed by slow drying under solvent vapor. This method is simple, does not require costly equipment, produces film thicknesses varying from 20 to 500 mc, and makes it possible to increase two- threefold the quantity of photo-active material (triple substituted anthracene) as compared with the block polymer, thereby making it possible to expand its area of application. In view of the high content of anthracene in polymethylmethacrylate (PMMA) and the partial compatibility of PMMA with anthracene, a study was made of the effects of low molecular weight additions on shaping the physical structure and optical-mechanical properties of Reoksan. Films were prepared from 10 percent PMMA in dioxane containing 0-45 percent anthracene and tested for heat resistance, water absorption, and clarity. The triple substituted anthracene has a plasticizing effect on the PMMA, the temperature of destruction initiation increasing with rising anthracene content, as does tensile strength. Figures 3; references 8: 6 Russian, 2 Western.

Evaluating Adhesive Properties of Adhesive Laminates

917M0096B Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 91 pp 14-16

[Article by V. N. Gorshkova, I. K. Grigoryants, and L. P. Raskina]

UDC 678.7.049.16:620.179.4

[Abstract] Adhesive laminates are used in medicine in bandaging and in surgical procedures; thus, development of methods for evaluating their adhesive properties for quality control purposes becomes significant. The fundamental property of medical grade adhesive laminates is the capability of adhering to human skin tissue with little pressure, the skin acting as a substrate. An objective qualitative evaluation of the strength of the adhesion bond requires a substrate simulating human skin. Testing methods differentiate between methods of rupturing the adhesive bond, i.e. uniform rupture, non-uniform rupture, and shearing as a special case of non-uniform rupture. In the present work a uniform rupture method was developed for evaluating the adhesive properties of medical grade adhesive laminates involving measurement of the forces required to separate an adhesive laminate from a substrate simultaneously throughout its entire area of contact. Adhesive bond strength was evaluated by its tensile strength in a specially made device consisting of a flange and metal and rubber rings. Tensile strength was measured as a function of contact area, rate of rupture, and contact time. Test results are reproducible to within +/- 5-11 percent. The method may be used in research to evaluate adhesive properties of newly developed laminates, as well as in quality control during production. Figures 3; references 12: 5 Russian, 7 Western.

Deformation-Strength Characteristics of Polynuclear Microfilters Based on Lavsan

917M0096C Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 91 pp 18-20

[Article by G. B. Bochkova and A. S. Yushin]

UDC 678.674'524'42.025.4.01:539.4

[Abstract] Membranes for macro- and microfiltration of liquids and gases are currently made by irradiating thin non- porous polymer films with uranium fuel fission products, or ions of certain metals accelerated in a cyclotron followed by chemical pickling of the breakdown products to give unobstructed pore openings of prescribed dimensions. In the present work a study was made of the deformation-strength characteristics of Lavsan microfilters, 0.12 micron pore size. Elongation curves of samples in the dry state, in water, in 96 percent ethanol, and after steam sterilization were analyzed. Steam sterilization in an autoclave resulted in a lowering of deformation-strength characteristics, and therefore a change in the structure of the polymer. Significant packing along the transverse direction and insignificant elongation longitudinally was observed. These changes probably have an effect on the filtering properties of the membrane which must be taken into account before such membranes are put to use. The results also demonstrated that Lavsan polynuclear microfilters are considerably stronger than those made of cellulose acetate. Owing to its non-hygroscopicity, the filtration properties of Lavsan in water or aqueous ethanol solutions remain unchanged at concentrations up to 30 percent. At higher ethanol concentrations, the deformation-strength characteristics decrease. Figures 2; references 20: 17 Russian, 3 Western.

Properties of Composite Materials Made of PVC and Lignocellulose Fiber

917M0096D Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 91 pp 23-24

[Article by V. M. Shapovalov, Ye. M. Lapshina, V. G. Barsukov, and S. V. Kkudin]

UDC 678.743.22:01678.542

[Abstract] Combining a thermoplastic material with a wood cellulose filler in conjunction with a high output production method, such as extrusion, helps raise the

technical-economic indicator of an enterprise and is also environmentally beneficial. However, using sawdust or wood shavings precludes production of high quality products for machine building or construction. Modified wood cellulose fiber appears to be a promising new filler in this respect, and in the present work a study was made of the effectiveness of using wood cellulose fiber to physically modify thermoplastic binders and the properties of extruded wood cellulose plastics. Press composites were prepared from defibrinated wood fibers 10-20 mm (type 1), 2-15 mm (type 2), and 0.5-2 mm (type 3). Emulsified or suspended polyvinyl chloride served as binder, and synthetic latex SKS-S was used to modify the filler. Results showed that addition of 20 percent type I filler increases the tensile strength of extruded plastic by 15-20 percent and reduces water absorption 25-30 percent, while addition of types II and III had no effect on the properties of the material. Fibers modified with the latex raised the tensile strength of the composite material 30-50 percent with 1.5 to two-fold decrease in water absorption and increased impact resistance as well. Figures 2; references 4: 3 Russian, 1 Western.

Effects of Polymer Film Surface Properties on Strength of Autogenous Joints

917M0096E Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 91 pp 27-29

[Article by V. A. Titov, V. K. Maksimov, Ye. S. Pavlova, G. M. Kuznetsova, and A. I. Maksimov]

UDC 678.073.488.01.029.43

[Abstract] In order to simulate and optimize technological processes of welding polymers with high frequency currents, it is first necessary to study basic factors having an effect on the process and its end results. Thus it is well known that the thermal contact welding capability of thermoplastics is related to the presence of contaminants, dust, or water on the surface, as well as its ageing due to external factors. In the present work a study was made of the surface effects of polyvinyl chloride, acrylonitrile-butadiene-styrene copolymer, and thermoplastic polyurethane and binary composites thereof on the strength of autogenous weld joints obtained by high frequency (27.12 MHz) currents. Surface properties were determined by measurement of wetting angles of benzaldehyde, nitrobenzene, ethylene glycol, glycerine, and water; work of adhesion, and glycerine transfer coefficient; and calculations based on wetting angles. Tensile strength measurements showed that autogenic weld joints are affected by the thermoplastic surface state, although there seems to be no single relationship between the strength of a weld joint and surface characteristics. The nature of the polymer itself has an effect on the resistance of the weld joint to shearing stress. Figures 2; references 6 (Russian).

Monolithization of Polymers with Ultrasonic Sound

917M0096F Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 91 pp 33-35

[Article by Yu. M. Budnitskiy, A. L. Golop, A. N. Gribanov, and M. S. Akutin]

UDC 678.742.02:534.8

[Abstract] High strength objects may be fabricated from polyolefins employing processes whereby a crystallizable polymer is deformed at a temperature below its melting point and a high degree of orientation becomes fixed. Large scale adoption of such methods is prevented by the necessity of preparing monolithic blanks from the material prior to extrusion, pressure casting, or pressing. Monolithization involves the use of ultrasonic sound to convert mechanical vibrations into heat energy while welding plastics under pressure. In the present work optimum process parameters are presented for the monolithization of powdered polymers (high pressure polyethylene and polypropylene) with ultrasound. Figure 1; references 3 (Russian).

Study of Kinetics and Composition of Secondary Polyethylene Pyrolysis Products

917M0096G Moscow PLASTICHESKIYE MASSY inRussianNo 1, Jan 91 pp 36-38

[Article by L. I. Karnaukhova, L. I. Guzeva, A. Ye. Guseva, and A. V. Pivovarov]

UDC 678.742.2:658.567.1:542.921

[Abstract] The re-use of secondary polyethylene, particularly that from agriculture, is one of the most pressing problems in the rational utilization of polymer wastes. One promising method appears to be thermal or catalytic destruction to recover the pyrolysis products and the released energy. Thermal analysis shows that in the absence of oxygen polyethylene has high heat resistance below 290° C. At higher temperatures the molecular weight drops and solid resinous products are formed. Volatile products are released at 370° C. Since data on the pyrolysis of waste polyethylene are limited, a study was made to determine the optimum conditions for the pyrolysis of low density secondary polyethylene in a specially constructed furnace type retort at temperatures ranging from 474° C to 650° C and at 15 minute intervals at 133 X 10^{-4} Pa pressure. The data demonstrate that vacuum pyrolysis is a promising method for recovering such useful products as ethylene and other olefins, aromatic hydrocarbons, olefin oils, and aliphatic waxes useful in petrochemistry. Figures 2; references 9: 7 Russian, 2 Western.

Migration-Resistant Fluorescent Pigments Based on MTSF- Polymer and Health-Hygienic Assesment of Polyethylene Colored Therewith

917M0096H Moscow PLASTICHESKIYE MASSY in Russian No 1, Jan 91 pp 47-48

[Article by L. N. Salvitskaya, Ye. N. Panasenko, T. A. Kitchenko, and T. V. Chumak]

UDC 678.742.2:535.371:61.71

[Abstract] Yellow and green dyes used to color polyethylene are in short supply and the development of new non-toxic migration-resistant dyestuffs has great significance. Fluorescent pigments based on melaminetoluenesulfamideformaldehyde (MTSF) are relatively harmless substances and are recommended for large- scale coloration of polyethylene. Research on animals conducted at the Labor Hygiene and Occupational Diseases Institute, Kharkov demonstrated that the fluorescent pigments are non-toxic and have a low level of biological activity (Class IV danger). The fluorescent dyes are produced by condensation of melamine, p- toluenesulfamide, and luminophors or a mixture of luminophor and a non-luminescent dye in the presence of disodium phosphate. The most toxic component is formaldehyde, and its venting to the environment, both during synthesis and during polyethylene dyeing, should be at a minimum. During recent years production has improved, with formaldehyde release reduced from 0.31 mg per cubic meter to 0, and the formaldehyde content in the dye itself reduced from 1.2 percent to less than 0.6 percent. Analysis of data shows that the above fluorescent dyestuffs could be used to color such products as children's toys and objects having contact with food products. References 4 (Russian).

Study of Process of High Speed Forming of Polycaproamide Complex Fibers

917M0120A Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 19-21

[Article by N. K. Zhiganov, V. A. Pantayev, L. M. Arkhipova, A. K. Sofonov, and A. A. Averyanov]

UDC 536.24:486.31.021

[Abstract] The study of high speed forming processes is normally carried out on monofilaments; formation of bundles of elementary filaments is characteristic in industrial processes. In this case the so-called cooperative effect takes place, manifested by a significant change in cooling conditions and the balance of forces acting on the elementary filaments inside the bundle. This brings about, on the one hand, a considerable spreading out of the elementary filament properties transverse to the bundle with the result that the average properties of the bundle may differ markedly from those of the monofilament; on the other hand, other factors may appear, such as the number of elementary filaments in a complex, the linear density of filament, and the rate of transverse air ventilation, which can have significant effects on the properties of a complex filament. In the present work a study was made of the fundamentals governing the effects of the forming conditions on the properties of polycaproamide filaments. It was demonstrated that in contrast to the formation of monofilaments, high speed forming of complex filaments is associated with the appearance of supplemental factors which may enhance the properties of the resulting fibers. The location of the oiling device is also significant in regard to the breaking strength. Other conditions being equal, a lower location of the oiler enhances formation of complex polycaproamide fibers having higher breaking strength and less elongation. Figures 3; references 3: 2 Russian, 1 Western.

Search for Optimal Conditions for Imidization of Polyamido Acid in Solution

917M0120B Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 22-24

[Article by T. A. Rozenkova, I. A. Vasilyeva, V. V. Yermakov, Z. G. Oprits, A. S. Spasskiy, and G. I. Kudryavtsev]

UDC [678.675:536.495].02:542.952.6

[Abstract] The preparation of heat resistant fibers from aromatic polyamides is related to the conversion of polyamido acids into polyamides by imidization. One method of imidization consists of the initial polyamido acid reacting with a dehydrating agent, with or without a catalyst. The process may take place in the solid or liquid phases. In the present work a mathematical model was developed simulating the imidization of polyamido acid in the liquid phase, and implementing the neighboring linkage effect theory. The mathematical model was then used to calculate the optimal conditions for preparing polyamide filaments. Figure 1; references 6 (Russian).

Analysis of Stable Zone in Aramatic Polyamide Fiber Formation Process

917M0120B Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 24-27

[Article by A. L. Zhuravlev, T. M. Getmanyuk, A. S. Spasskiy, and V. S. Matveyev

UDC [677.494.675:536.495].021.125.2

[Abstract] Selecting optimum conditions for stable fiber formation of is one of the basic problems facing the development of technology for the preparation of new chemical fibers and the increased productivity of the fiber making machines. Breakdown of the fiber forming process may occur as a result of several mechanisms, e.g. hydrodynamic instability, or breakdown in cohesion resulting in complete or partial rupture of the elementary filaments making up the fiber, or in cross sectional non-uniformity of the fiber. Total fiber rupture during

preparation of highly worsted fibers is an alarm signal during the process and results in direct losses in production. In the present work a wide range of conditions for aromatic polyamide fiber formation in a settling bath was analyzed with special emphasis on the limitations of stable fiber formation and determination of the limiting parameters of the process, such as maximum flow rate of the polymer solution, but still providing process stability for a given spinneret drawing rate. Figures 3; references 9 (Russian).

Electrochemical Study of Caprolactam Solutions

917M0120D Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 27-29

[Article by Ye. S. Men]

UDC 677.494.675

[Abstract] Study of electrochemical processes occurring within caprolactam solutions could help in the search for more efficient means of monomer refining and regeneration. Problems associated with utilizing electrochemical methods to synthesize monomers and other, especially organic, chemical reagents are well known; data on using these methods for lactam refining do not exist. Advantages of electrochemical methods are associated with oxidation-reduction reactions occurring at the electrodes. These reactions may be conducted without adding any other reagents, and therefore without any additional steps in eliminating side products or accumulation of sludge to contaminate the environment. Reagent-free refining also has such advantages as simple equipment design, requiring less working space and personnel. In the present work studies were conducted in a thermostatically controlled cell in which the anode and cathode were separated by a diaphragm and maintained at 20- 70° C. Stationary carbon and lead electrodes were used in experiments conducted in neutral, alkaline (pH=12), and acid (pH=3) media against a sodium nitrate background to increase electrolyte conductivity. Electrochemical treatment of caprolactam in alkaline media over carbon electrodes lowered the permanganate number, evidently the result of amino groups in the anolyte. Electrochemical reduction is limited by concentration polarization. Oxidation products were not observed in acid media, making lactam regeneration theoretically possible. Lactam treatment depends chiefly on the nature of the electrode and the background, the pH of the electrolyte, and the temperature. Figures 3; references 6: 5 Russian, 1 Western.

Features of Rigid Chain Polymer Fiber Formation Through Air Gap

917M0120E Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 32-34

[Article by G. A. Belinskiy, V. N. Kiya-Oglu, and V. G. Kulichikhin]

UDC [677.494:536.495].021.125.2[678:536.495]-404.5.01:539.374

[Abstract] While in the process of forming fibers from solutions of poly-p-phenyleneterephthalamide (PFTA) and poly-p- phenylene-1,3,4-oxadiazole (POD) through an air gap, the diameter of the polymer stream pulsates. This phenomenon, stable over time, has been named drawing resonance in the literature if the drawing frequency of the polymer stream in the air gap exceeds a certain critical value. In the present work fibers were formed from a 19.5 percent (by weight) solution of PFTA in sulfuric acid through drawing plates of various cross section profiles at 80° C. Isotropic solutions of POD in sulfuric acid were used for comparison. Fiber forming at high drawing frequency through an air gap is unstable owing to pulsations in the polymer stream diameter. Resonance parameters were obtained for several model drawing plates having various length-to-diameter ratios and various air entry modes. Resonance is a function of the conditions of polymer solution flow through the drawing plate channel, and the temperature gradient in the air gap. Figures 2; references 8: 2 Russian, 6 Western.

Features of Rigid Chain Polymer Fiber Formation Through Air Gap - Comparison of Experimental Results with Theory

917M0120F Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 34-36

[Article by G. A. Belinskiy, V. N. Kiya-Oglu, and V. G. Kulichikhin]

UDC 677.494:536.495.021.125.2
678:536.495.404.5.01:539.374

[Abstract] In a previous work [cf: 917M0120E] experimental data were presented on the stability of monofilament fiber formation from sulfuric acid solutions of poly-p- phenyleneterephthalamide [PFTA] and poly-p-phenylene-1,3,4- oxadiazole [POD] for a number of model drawing plates having various length-to-diameter ratios. In the present work these data are compared with existing theoretical analyses on polymer stream drawing stability. It is demonstrated that the generalized Maxwellian liquid model holds for isotropic solutions of POD and liquid crystal solutions of PFTA, taking into account the high elasticity reaction of the medium in the drawing process and the relationship between the relaxation time of the medium and the rate of deformation. Figure 1; references 8: 1 Russian, 7 Western.

Shortened Finishing Methods for Viscose Fibers

917M0120G Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 37-38

[Article by K. A. Sasykbayeva, M. B. Radishevskiy, and A. T. Serkov]

UDC 677.463.021.125.52

[Abstract] Using high quality cured viscose stock makes it possible to shorten the fiber finishing methods. In the present work it was demonstrated that it is possible to shorten the finishing time for high modulus viscose fiber by combining the peroxide bleaching and high temperature treatment stages after the cutting stage. Heat treatment is carried out in a separate chamber. The fiber is bleached to 79-80 percent with less settling. Figure 1; references 2 (Russian).

Eperimental Method for Evaluating Quality of Core-Shell Interface in Polymeric Light Conductors

917M0120H Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 40-41

[Article by M. A. Maryukov]

UDC 681.7.068.4.08

[Abstract] Polymeric optical fibers are widely used as a result of their flexibility, ease of preparation, and wide apertures and diameters. One of the main sources of energy loss in polymeric optical fibers is at the core-shell interface, and an experimental evaluation of the quality of this interface is most significant both from the standpoint of correct selection of a polymer pair for the core and the shell, and in helping to explain the reasons for energy loss in process development. In the present work a qualitative method was developed that is based on measuring both total energy losses and those losses occurring at various lead angles of a flat wave in a short fragment of fiber. The method may also be used with a non-uniform core and makes it possible to evaluate the nature of excess losses at the interface (defects due to dissipation or light absorbing impurities). Figures 2; references 3 (Russian).

Modifying Polycaproamide, Its Structure and Some of Its Properties

917M0120I Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 44-47

[Article by N. N. Barashkov, V. N. Vysotskiy, I. N. Girgoryeva, V. N. Skopintseva, L. A. Ozerina, and V. I. Selikhova]

UDC 541.64:539.3

[Abstract] Structural and chemical modification is one of the most promising methods of coloring and changing the properties of polycaproamide (PKA). It consists of incorporating dyestuff fragments, luminophors, or light stabilizers into the polymer chain during synthesis. Advantages lie in combining the synthesis and coloring processes, as well as increasing the UV- resistance of the modified polymer. In a previous work PKA was structurally and chemically modified with sodium diaminostilbenedisulfonate for the purpose of imparting the polymer with fluorescent properties and increasing its coloration with basic dyes of the cationic gold-yellow 2K type. In the present work a study was made of the structural and chemical modification of PKA with fragments of six different aromatic diamine chromophors. The spectral and luminescent characteristics of modified PKA fibers and films are presented. A light stabilizing effect and, in some cases, antirad activity of the chromophor groups were observed. Figures 2; references 14 (Russian).

Structural Features and Strength of Carbon Fibers

917M0120J Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 47-49

[Article by V. V. Kochetkov, T. V. Rybakova, I. L. Kumok, N. V. Tarakanova, M. T. Azarova, and A. N. Ozerin]

UDC 678.067.5

[Abstract] The relationship between the structure and mechanical properties of carbon fiber is one of the most pressing problems in materials handling. Although much work has been done, a total concept of the effects of structural parameters on the strength of carbon fibers still does not exist. This attests to the structural complexity of carbon fibers and the many factors affecting their strength. In the present work the dimensions and ordered region orientation, and heterogeneous structure were determined for a number of foreign and domestic high strength carbon fibers. Characteristic features in the behavior of carbon fiber structure with changes in the ordered region were determined. It was demonstrated that high strength carbon fibers have small dimensions in the ordered and disordered regions together with a high mean density in the ordered and porous phases. An attempt was made to correlate the tensile strength limit with the heterogeneous structure parameters of the carbon fibers. Figures 5; references 11: 2 Russian, 9 Western.

Action of Orthophosphoric Acid on Properties of Freshly Formed Nitron Fiber

917M0120K Moscow KHIMICHESKIYE VOLOKNA in Russian No 1, Jan 91 pp 50-52

[Article by Zh. A. Zgibneva, K. E. Ergashev, Kh. Kh. Mamatkulov, and N. G. Kerimova]

UDC 541.64.532.77

[Abstract] Inclusion modification of freshly formed nitron fiber is used by many researchers to prepare fibers having special properties. The basic concept of the method lies in using a gel-fiber having a well-developed

inner surface area and therefore good sorption capability. This method enables the realization of several technological possibilities, such as imparting nitron with fire resistance by treating the fiber with aqueous orthophosphoric acid or its derivatives. In the present work a study was made of the sorption kinetics of phosphorus on nitron gel-fiber from aqueous solutions of o-phosphoric acid in respect to concentration, time and temperature characteristics, and an evaluation of the change in the fiber surface using electron microscopy. It was demonstrated that inclusion treatment of freshly formed nitron fiber with o-phosphoric acid solutions results in hydrolysis of the surface layer which significantly alters the fiber surface. In order to give the fiber a fire- resistant capability, it should be treated with moderate concentrations of o-phosphoric acid at temperatures below 30° C. Under these conditions the physical and mechanical specifications of industrial grade nitron remain within the limits set by GOST. Figures 3; references 3 (Russian).

Recycling Wastes From the Production of Biologically Active Substances in Rubber Based on Butadiene-Nitrile Caoutchouc

917M0131D Kiev KHIMICHESKAYA TEKHNOLOGIYA in Russian No 3, May-Jun 91 (manuscript received 28 Nov 88) pp 21-23

[Article by N.Ya. Gracheva, G.M. Sheshina, T.V. Ratnikova, and A.I. Ginak, Leningrad Technological Institute]

UDC 678.044:547.241

[Abstract] Enterprises producing biologically active substances such as antibiotics currently generate up to 60 tons of waste a day. Using these wastes in agriculture has been problematic in view of several negative consequences. In an attempt to find new uses for the aforesaid wastes, the authors of the study reported herein examined the possibility of recycling the wastes generated in the production of streptomycin in rubbers based on SKN-26M butadiene-nitrile caoutchouc in combination with octamethyltetraamidopyrophosphate. For their research the authors manufactured model rubber mixtures based on SKN-26M caoutchouc. They discovered that adding wastes from streptomycin production in an amount between 5 and 10% by weight results in a mixture with weak vulcanization activity. The optimal vulcanization time at 151°C is between 90 and 150 minutes. Moreover, the vulcanized rubber is characterized by reduced strength. It was thus discovered that the streptomycin production wastes could only be used as a secondary accelerator when a fungicide was present in the rubber. When used in combination with octamethyltetraamidopyrophosphate, however, the wastes from streptomycin production added in an amount ranging from 3 to 5% by weight increased the resistance of the resultant rubbers to damage due to mold. Tables 2, references 10: 9 Russian, 1 Western.

Trapping and Neutralizing Toxins Formed When Plastics Are Processed at the Plasta Plant in Vilniyus

917M0132A Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 11-12

[Article by A. Grishkyavichyus, P. Kiznis, and M. Zhalinayte

UDC 678.6:65.012.8:66.013

[Abstract] As is the case in other enterprises in the plastics industry, pressed products account for a significant percentage of the products produced at the plant Plasta in Vilniyus. Phenoplast, aminoplast, and fibrous, friction, and other pressing materials are used to produce these pressed products. In view of the high toxicity of these products, Plasta has redesigned its procedures for producing pressed plastic products. The new procedure includes provisions for trapping and neutralizing toxins formed during the pressed product production process. Before the redesign program, the average concentration of phenol in the work area amounted to 1.1 mg/m^3, which was a factor of 3.3 in excess of the minimum allowable concentration. By increasing air transfer and encapsulating the presses, the phenol levels were reduced to below the minimum allowable level. This created a new problem, however. Removing toxins from the work area increases atmospheric emissions of phenol, formaldehyde, and carbon monoxide. A catalytic-adsorption approach was selected to solve the problem. Cooperative efforts between Plasta, the Institute of Physical Chemistry imeni L.V. Pisarzhevskiy [IPC] of the UkSSr Academy of Sciences, and the Gosplastproyekt of the USSR Ministry of the Petrochemical Industry resulted in the development of a prototype unit, designated the PKOV-5M, for catalytic-sorption scrubbing of the ventilation emissions from the plant's production line (which consists of 11 presses). The new unit is designed to work with the newly developed catalyst MKP-1. The catalyst, which was developed by the IPC, is a modified manganese oxide catalyst-sorbent that does not contain expensive metal and that essentially meets all of the requirements stipulated for catalysts to be used in catalytic-sorption scrubbing. Regeneration conducted at a temperature above 100°C results in the oxidation of phenol and formaldehyde to CO_2 and steam. Regeneration is accomplished by gradually heating the emissions in an air stream from 100 to 300°C over a 12-hour period. Sixteen of the RKOV-5MA units (capable of processing 96,000 m^3 ventilation wastes per hour) have been manufactured for the Plasta plant. The catalyst was provided by the IPC and guaranteed to have a useful life of 1 to 5 years. Filling the 16 units will require 22 tons of catalyst-sorbent at a cost of 5,000 rubles per ton. Outfitting the plastic processing shop with the new system cost 400,000 rubles. References 1 (Russian).

Creating No-Waste Production for a Standard Plastics Processing Plant

917M0132B Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 12-13

[Article by E.Ye. Deyzenrot, G.S. Selezneva, G.D. Kalinovskaya, and A.K. Khirin]

UDC 678.027.002.8:66.013

[Abstract] The Leningrad Plastics Products Plant is a typical plastics processing plant located in the heart of a city in a residential area. Hence, it is very important that the problem of protecting the environment from the plant's industrial waste be solved. Phenol and hydrogen fluoride vapors from the production of fluoroplastic products and phenoplast dust account for most of the plant's emissions into the atmosphere. The levels of such emission are constantly monitored. When they exceed 0.5 g/m^3, they are neutralized in thermocatalytic air cleaning units, which are widely used throughout the country. Because the concentration of organic pollutants in the plant's ventilation wastes does not reach 500 mg/m^3, thermocatalytic scrubbing has been deemed unfeasible for use at the plant. However, because the plant is so close to residences, the plant administration has decided to halt production of a portion of its products made from phenoplasts. This has made it possible to noticeably reduce the concentration of volatile phenol. The plant is further planning to clean all of its ventilation wastes by the method of wet ozone treatment in a special scrubber filled with thermoplastic packing. The method, which was developed by workers at the Ivanovo Chemical Technology Institute, will be implemented by the Redoks-sistema Ecological Engineering Office in Ivanovo. The new unit will permit simultaneous cleaning of the plant's ventilation wastes and the polluted water of the plant's water circulation system. The Redoks-sistema office has also successfully developed a prototype dry ozone treatment unit to clean the air in phenoplast shops. The unit is based on the principle of artificial ozone enrichment of the air passing through the unit. Such ozone enrichment facilitates a sharp reduction in bacterial contamination and dust content by ionizing the air, improves shop workers' sense of well-being, and serves as a deodorizer. The new ozone generator, termed the Ozotron, has a capacity of 5 to 20 g/h, requires 1.5 to 2 kW and 220 V, weighs 60 kg, and measures 2,000 x 900 x 600 mm. The Leningrad Plastics Processing Plant also has to deal with a small amount of solid thermoplastic wastes in the form of ingots. These are cut up and may be recycled for such purposes as pavement components. References 3 (Russian).

The Catalytic-Sorption Method of Scrubbing Gaseous Wastes From the Production of Plastic Products

917M0132C Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 13-15

[Article by V.Ya. Volfson]

UDC 678.7.02:66.074.48

[Abstract] Because of their relatively low (close-to-room) temperature, large volume, and low (albeit significantly above the minimum allowable) concentration of toxins, gaseous wastes from the production of plastic products do not lend themselves to the thermal, thermocatalytic, and absorption methods that are widely used to remove toxic organic compounds from industrial wastes. Before such processes can be used successfully with the gaseous wastes formed when plastics are produced, a way to lower the process temperatures must be developed. A palladium-promoted manganese oxide catalyst developed by the Institute of Physical Chemistry of the UkSSR Academy of Sciences to remove hydrocarbon impurities from air can be used at temperatures of 150 to 250°C, which is 100 to 150°C lower than familiar commercial catalysts. Although even this temperature is still higher than the desired temperature for thermocatalytic cleaning of the gaseous wastes formed during the manufacture of plastic products, studies of the deep oxidation of organic matter by the oxygen of air at room temperature revealed that the aforesaid catalyst can be used in developing a catalyst-sorption method of scrubbing gas that could work at the temperatures typical of the gases evolved during the production of plastic products. Such a process was worked out by using the new manganese oxide catalyst and the RKOV-5-2M radial-type reactor (also developed by the Institute of Physical Chemistry). This new reactor features a low gas dynamic resistance (up to 1,200 Pa) and can handle 6,000 m^3 air per hour. The new process operates as follows. The air to be cleaned passes through a fluid bed of the proposed granular catalyst-sorbent at room temperature. Chemisorption of the organic impurities present in the air then occurs. Thanks to the low concentration of toxins in the air typically resulting from plastic processing and the comparatively high absorbency of the catalyst, the process of scrubbing the gases until the minimum allowable concentration standards are met generally takes 200 to 300 hours. Regenerating the catalyst-sorbent takes 10 to 12 hours of gradual heating. More than 95% of the cleaning time in the new process occurs at room temperature, which saves considerable energy. The new process has been introduced at the Plasta Production Association in Vilniyus, the plant Kharplastmass, and the plant Mayak in Kiev. Commercial production of the catalyst and reactors has been set up. References 11 (Russian).

Secondary Polymer Resources and the Efficiency of Using Them

917M0132D Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp -

[Article by A.S. Lukashevich]

UDC 678.743.46.003.13:658.567.1

[Abstract] Expanding the use of wastes formed during the production and processing of plastics is one way of conserving primary raw material and protecting the

environment. Using 1 ton of secondary polyethylene, for example, saves 1.1 tons of primary polyethylene or 16.5 tons of oil. The enterprises of the plastics subsector currently generate more than 80,000 tons of synthetic resin and plastic wastes annually. Of this amount 84% is currently being used (about 20% in subsector enterprises). This includes 98.4% of the polyethylene wastes (4.6% in the subsector), 87% of the polyvinylchloride wastes (49% in the subsector), 77.5% of the polystyrene wastes (15.6% in the subsector), and 88% of the polypropylene wastes (19% in the subsector). Each year the subsector produces about 52,000 tons of various products (including 200 million rubles' worth of consumer goods) either exclusively or partially from these wastes. Practice has demonstrated that further increases in the amounts of such wastes used are being held up not so much by a lack of scientific developments as by problems in introducing new methods into industry and by flaws in the economic mechanism. In the areas of planning and administration, for example, a special program must be developed to increase the use of polymer wastes in the national economy, and new ways of using secondary polymer materials must be sought. Scientific research and experimental design projects geared toward the development of new technologies and equipment for processing polymer wastes must be funded and implemented. A policy must be created to disseminate information regarding waste recovery and recycling to interested enterprises and organizations. Economic incentives, particularly the use of economically substantiated prices, are equally important in increasing the use of secondary polymer materials. The experience of other countries that offer special financial incentives to enterprises using the wastes that they themselves produce should also be considered for adoption in the USSR.

Solving the Ecological Problems in the Production of Epoxy Resins

917M0132E Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 16-18

[Article by V.P. Sirokin, N.V. Dzumedzey, and Ye.V. Rudnenko]

UDC 678.686:628.543

[Abstract] The production of epoxy resins generates up to 7 m^3 of liquid wastes (wastewaters) and gaseous emissions containing 150-200 kg epichlorhydrin and 80 to 120 kg toluene per ton of resin. At present, these wastewaters are subjected to biochemical treatment or deep evaporation followed by selective by-product extraction, and the gaseous wastes are scrubbed by conventional methods. Because the latter are inefficient and do not yield good results, a study was undertaken to modify the process of producing epoxy resins by perfecting a technology for scrubbing the gaseous wastes generated and recirculating individual flows of materials. The main distinction of the new process lies in the method used to separate the hydrolysis products (polyglycerins) and common salt from the reaction mass. The conventional method uses flushing with water for this purpose. The new process uses centrifugation, which eliminates the use of water rinses and the formation of wastewaters. The new technology is further distinguished by its use of a separator to separate the water-alkali and toluene layers in a stage of deep saponification. This is followed by neutralization of the toluene resin solution by carbon dioxide. This technique makes it possible to eliminate the water rinses used in the conventional technology and improves the resin's quality. The high quality of the resin resulting from using the new technology is achieved by recycling the circulating toluene that has been cleansed of epichlorhydrin and recycling the dewatered neutralized epichlorhydrin (which improves the resin's quality by facilitating the condensation reaction). Besides its ecological advantages, the new technology results in three commercial products in addition to the main product. These are polyglycerins, a common salt solution, and chloroglycerin. Figure 1.

Reserves for Increasing the Ecological Cleanliness and Economic Effectiveness of Using Polyethylene Film in Protected Soil

917M0132F Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 19-20

[Article by I.N. Kotovich]

UDC 678.742.2-488.003.13:631.545

[Abstract] In 1989 consumption of polyethylene film for protected soil in agriculture reached 80,000 tons. Despite this, only half the demand for the product was met. Simply doubling production to address the shortage is not an adequate solution because increasing the amount of polyethylene film produced and used would only add to existing ecological problems. Instead, the author of the study reported herein proposes attacking the problem of a shortage of polyethylene film by making greater use of light-stabilized films with an extended useful life. Type SK (GOST 10354-82) unstabilized polyethylene film now accounts for most of the polyethylene film used to protect soil. The use of type ST (GOST 10354-82) light-stabilized polyethylene film is still very low. In 1989 it constituted only 5% of the total amount of polyethylene film shipped. The type N polyethylene film that is sold to the public creates additional environmental problems because its weather resistance is even lower than that of the SK film that predominates in agriculture and thus must be replaced even more frequently than the SK film. Tabular data presented regarding the weather-resistance (useful life), cost, and consumption of light-stabilized and non-light-stabilized polyethylene films confirm that more extensive use of the stabilized variety (i.e., using type ST versus SK or N) would reduce the amount of film needing to be replaced

and thus cut down on production demands and on waste generated. Tables 2; references 2 (Russian).

Using Wastes From Furfuryl Alcohol Production To Produce Foamed Plastics

917M0132G Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 22-23

[Article by A.M. Samatov, M.I. Askarov, M.G. Alimukhamedov, and F.A. Magrupov]

UDC 678.664.547.723-405.8

[Abstract] The recent increases in the amounts of polymers and polymer additives have been accompanied by increases in the amount of wastes generated from synthesizing monomers and plastics and from using products made of them. One promising avenue for reducing the amount of wastes generated when polymers are produced is to recycle them by using them to produce polymer composites. This avenue can be taken in the case of the furfurol generated as a waste product by the hydrolysis industry. Hydrogenation of furfurol results in furfuryl alcohol, which can in turn be used to produce polymers with properties that are more valuable than those possessed by furfurol-based polymers. The authors of the study reported herein explored the feasibility of using the cubic residue of furfuryl acid that is left after rectification of the final product in the production of furfuryl alcohol to produce polyfuran foam and rigid polyurethane foam. Because of the low solidification capabilities of the cubic residue of furfuryl alcohol, strong low-molecular-weight mineral acids had to be used to synthesize polyfuran foam. To achieve the optimal relationship between the rates of foam and urethane formation in the compounds synthesized, the authors used the low-molecular-weight catalysts triethanolamine and dimethylethanolamine. Triethanolamine was found to catalyze foam and urethane formation reactions and, at the same time, act as a cross-linking agent. Dimethylethanolamine was determined to be a more active catalyst of the foam formation process. The authors succeeded in producing rigid polyurethane foams based on the cubic residue of furfuryl alcohol that could be used to produce polyfuran foam and rigid polyurethane foams. The foams produced could in turn be used to insulate heating lines and joints of outer wall panels. Figures 2, table 1; references 3 (Russian).

Vacuum Technology—A Way of Solving the Ecological Problem When Producing Coatings From Polymer Powders

917M0132H Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 23-24

[Article by N.I. Tishkov]

UDC 678.026.3:621.78.061

[Abstract] Polymer coatings are generally produced in air at atmospheric pressure. This inevitably leads to the spread of powders throughout work areas, which in turn creates fire and explosion hazards and has a deleterious effect on workers' health. Using a vacuum as a medium in which powder coatings are applied eliminates the aforesaid negative ecological effects of the conventional powder coating technology. It has been established that the threat of the formation of dangerous concentrations of powders is eliminated with even the comparatively low rarefaction (a residual pressure of about 10 MPa) that can be achieved by using conventional mechanical equipment. The use of vacuum technology also eliminates the oxidation destruction of macromolecules. Because of this fact, the temperature range in which coatings can be formed in a vacuum is much wider than the temperature range possible when the conventional technology of applying coatings in air is used. The vacuum technology also yields high-quality coatings with good tensile strength and microhardness and with minimal porosity. Coatings produced in a vacuum are thus more weather resistant. The low-molecular-weight atmosphere-polluting products formed when the conventional powder technology is used do not pose a problem when the vacuum technology is used; the volatile products generated during vacuum application of coatings can be virtually completely trapped. Technological techniques and an experimental technology for applying polymer powder and film coatings onto pipe in a vacuum have been developed and published elsewhere. Figure 1; references 7 (Russian).

Powder Thermoplastic Polyurethanes To Produce Coatings

917M0132I Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 34-35

[Article by I.M. Timofeyeva, Ye.A. Kirillov, F.K. Samigullin, Yu.M. Frolov, M.P. Letunovskiy, and S.D. Bondarev]

UDC 678.664.743.46-492.2

[Abstract] Using the powder technology of applying coatings solves a number of technical, ecologic, and energy problems. Powder coatings can be produced by coagulating latex, evaporating a disperse medium when drying latex, precipitation from a solution, or cryogenic pulverization. When used with polyurethanes, however, these methods all have significant shortcomings associated with the use of large amounts of solvent or liquid nitrogen as well as with high energy expenditures. These problems are largely eliminated when powder polymer is synthesized in an inert medium. Highly dispersed powder thermoplastic polyurethanes have been developed that are produced by interphase polycondensation in a liquid hydrocarbon medium in the presence of special high-molecular-weight oligoethersiloxane-type surfactants. The authors of the study reported herein

examined the laws governing interphase polycondensation of thermoplastic polyurethanes whose starting components had different chemical structures. They also analyzed the shape of the thermomechanical curves and deformation and strength indicators of analogous thermoplastic polyurethanes produced by the methods of interphase polycondensation and others formed in bulk from a solution of N,N'-diethylformamide. The two synthesis methods were found to result in similar deformation and strength indicators. The thermoplastic polyurethanes produced by interphase condensation did, however, have higher tensile strengths. The amount of surfactant and the method used to add it had little effect on the properties of the thermoplastic polyurethanes formed from a solution. Hot application yielded coatings that were not as strong as those poured from solutions. A technology for producing powder thermoplastic polyurethanes based on various hydroxyl-containing components was also tested. Using several new and existing hydroxyl-containing components made it possible to produce thermoplastic polyurethanes with a wide range of properties and high physicomechanical indicators. A test unit for use in producing such thermoplastic polyurethanes at a rate of 6 to 10 kg end product per hour was also developed. The resultant polyurethane may be used to produce a solvent-free adhesive that can be used in light industry and that has an adhesive strength that is twice to triple that of conventionally produced adhesives. This adhesive, which could be used in the textile and automotive industries, could greatly reduce both gluing time and the amounts of equipment and energy required when adhesive solutions are used. Figure 1; references 2 (Russian).

Electrodialysis Treatment of Wastewaters From Thiuram D Production

917M0132J Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 35-37

[Article by N.N. Stepanova, N.P. Zhorkina, P.A. Pirogov, and M.B. Kliyut]

UDC 678.7:547.496.2:628.543.3

[Abstract] The production of most chemical additives generates a large amount of highly mineralized wastewaters containing products that do not easily lend themselves to biological oxidation. The wastewaters generated by the Ogrsintez Production Association during the production of tetramethylthiuramdisulfide (thiuram D) amount to about 40 m^3 for each ton of thiuram D produced. These wastewaters are acid solutions (pH, 2.0) containing 30 to 39 g/l sodium sulfate and 0.45 to 0.60 g/l organic impurities. These wastewaters are currently mixed with the plant's other wastewaters and directed to a biological treatment facility. The amount of organic products and mineral salts contained in the waters sent for treatment is twice the annual amount agreed on by the plant and the treatment facility. In view of this fact, research was conducted to assess the feasibility of electrodialysis treatment of the wastewaters generated by production of thiuram D. A laboratory unit designated the Rodnik-9 (analogous to the prototype Rodnik-3) consisting of 11 cation exchanger (MK-40) and 10 anion exchanger (MA-40) membranes between two platinized titanium membranes was used during the research. The electrode used had a useful volume of 0.00527 m^3. The wastewaters were subjected to a two-stage treatment process regardless of their initial pH. The treatment technology tested proved to be effective in reducing the wastewaters' acidity and organic impurities. A procedure was also worked out whereby Na_2SO_4 from the brines-concentrates resulting from treatment of the wastewater in the Rodnik-9 unit could be recovered after being diverted to an RVO-64 rotation-type evaporator. The recovered powder (consisting of 87.6% Na_2SO_4) meets the requirements stipulated in specification TU 6-14-10-26-78 for finished product. Figure 1, tables 2.

Thermal Breakdown of Polyethylene Wastes

917M0132K Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 37-38

[Article by E.K. Piyroya and N.P. Nikitina]

UDC 678.742.2.002.8:66.092

[Abstract] As the amounts of polyethylene produced and used in the USSR increase, so too do the amount of polyethylene wastes. Scrubbing the wastes and using them as a secondary raw material is expensive, and the resultant product's physicomechanical properties are not as good as those of the initial product. Burning polyethylene waste is fraught with a number of technical and environmental problems. Using thermal breakdown to recover polyethylenes is promising, however. Thermal breakdown makes it possible to preserve the structure of the hydrocarbons formed and thereby obtain a valuable petrochemical raw material. This method, which has been researched rather extensively, is flawed by the high temperature required. In view of these facts, the authors of the study reported herein examined the development of a process for thermal breakdown of polyethylenes under conditions wherein aliphatic hydrocarbons are the only breakdown products. A special laboratory unit, whose main component was a column-type reactor 0.5 mm in diameter, was developed for the study. Pulverized worn agricultural polyethylene film containing 5.9% mineral impurities was used for the studies. The melt temperature was varied between 450 and 525°C. The resultant products were trapped in condensers. Ten parallel tests were conducted in each mode, and the data collected during each set of parallel tests were averaged. At a temperature of 450°C the unit produced 5.18 g of polyethylene per cm^2 per hour, at 475°C it yielded 9.26 g of polyethylene per cm^2 per hour, and at 500°C and 525°C it yielded 15.50 and 26.04 g of polyethylene per cm^2 per hour, respectively. The higher the test temperature, the more alkenes formed. At 525°C the ratio of the

number of n-alkanes to 1-alkenes approached 1:1.5. C_{17-25} hydrocarbons were the predominant product. This fraction is the most valuable for organic synthesis. The thermal breakdown procedure also yielded compounds that can be used as foam extinguishers and detergents. The technology developed may be used to recover wastes of other polymers as well (including those from used tires and old cable insulation). Table 1; references 22: 3 Russian, 19 Western.

Using Gas Chromatography To Monitor the Content of Toxins in a Gaseous Medium and in Wastewaters

917M0132L Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 pp 43-45

[Article by Ye.Ye. Sotnikov]

UDC 678.7.02:628.543:543.544.25

[Abstract] Analyzing the content of toxins in gaseous media or wastes from plastics production and processing when such impurities are present in an amount between 10^{-6} and 10^{-9}% is a complicated task. It can be done by using gas chromatography in conjunction with devices to separate, trap, and enrich volatile substances. The authors of the study reported herein tested a procedure combining these two techniques. They used a thermal desorber combined with a chromatograph evaporator to identify toxic gases and vapors in air samples and the content of residual solvents and volatile substances in water. The exact procedures used in both cases are detailed in this article. They succeeded in identifying impurities present in the test gaseous medium in amounts ranging from 10^{-8} to 10^{-6} mg/l, which is tens of times less than the minimum allowable concentration values of many of the compounds identified. By concentrating impurities from large (up to 1 liter) volumes of water on Tenax, they were able to analyze selected compounds when present in amounts of $\leq 10^{-9}$%. This detection range is suitable for use in monitoring the toxin content of drinking water and artesian wells located close to food and organic waste burial sites (dumps). Figure 1; references 6: 5 Russian, 1 Western.

Detoxication of Waste Ingredients in the System Plastics Production-Plants

917M0132M Moscow PLASTICHESKIYE MASSY in Russian No 2, Feb 91 p 49

[Article by S.N. Zhugastr]

UDC 678.5:66.013:66.074.48

[Abstract] Landscaping holds great promise as a way of helping to reduce the negative environmental effects of industrial wastes generated by such processes as the production of plastics. Rational landscaping can help create optimal sanitary and hygiene conditions because plants are not only capable of reducing the negative impact of toxic industrial wastes but are also capable of altering thermal conditions, humidifying air, moderating disease-inducing microbes, and exerting a positive psychological effect on man. Plants bind absorbed gaseous ammonium and form amides, amino acids, and ammonium salts. Plants also absorb sulfur gas in the form of sulfates accumulated in vacuoles and partially bound by organic bases. Furthermore, plants are also capable of transforming virtually all nitrogen oxides into nitric and nitrous acids. Benzene is oxidized by plants. Using plantings to accumulate the nitrogen oxides emitted into the atmosphere around enterprises reduces the deleterious effects of the said compounds on human health. The author of this concise report constructs a linear regression equation modeling the effect that planting a specified area of vegetation has on reducing toxic emissions resulting form the production of caprolactam, adipic acid and hexamethylene diamine salts, and organic acids. References 2 (Russian).

Liquid Rubber With Terminal Amino Groups: Synthesis, Setting and Physical Properties

907M0142A Moscow KAUCHUK I REZINA in Russian No 3, Mar 91 pp 3-6

[Article by Yu. L. Morozov, D. L. Fedyukin and S. L. Knyazhanskiy]

UDC 541(64+127):542.954

[Abstract] Liquid rubber with terminal amino groups offers the advantage of high quality elastomers following compounding with reagents reacting with amino groups. A convenient method for production of polymers with terminal amino groups—oligobutadiene-amidodiamine (I)—is represented by the reaction of oligobutadiene carboxylate (II) with excess hexamethylenediamine (III) and removal of water formed in the reaction with anhydrous sodium sulfate. The MW of I is easily controlled by varying the III/II ratio, with the chain length dropping sharply in going from 2 to 5. Compounding I with bis(poly)-functional isocyanate-, epoxy- and acrylo-compounds yields linear or cross-linked multiblock elastomers with commercially desirable physical properties. Figures 6; tables 3; references 8: 7 Russian, 1 Western.

Dispersive Action of Third Phase in Elastomer Mixtures

907M0142B Moscow KAUCHUK I REZINA in Russian No 3, Mar 91 pp 6-8

[Article by Yu. P. Miroshnikov, Yu. N. Voloshina and Ye. V. Zinukova]

UDC 678-19.021.16

[Abstract] Improvements in the quality of thermodynamically incompatible polymer-polymer compositions can be accomplished by addition of low concentrations of a dispersant polymer. Studies on polychloroprene/

chlorobutyl rubber compositions (30:70) showed that maximum stability of this viscoelastic emulsion is insured by addition of 5% nitrile rubber (SKN-40). The mechanism of action rests on coating of the polychloroprene droplets with a nitrile film which prevents coalescence of the polychloroprene component. Microscopic and physical studies demonstrated that maximum dispersion is obtained when the viscosity of the dispersing agent is below or equal to matrix (chloro butyl) viscosity but greater than that of polychloroprene. Additional research will be required to fully define the mechanism of action of the dispersing agents, although it has been determined that the viscosity ratio of the dispersing agent to that of the matrix should be in the 0.7-0.8 range. Figures 3; tables 1; references 9: 7 Russian, 2 Western.

Chemical Fixation of Anisotropy of Elastomers With Viscous Fiber Filler

907M0142C Moscow KAUCHUK I REZINA in Russian No 3, Mar 91 pp 12-14

[Article by I. D. Gabibullayev, G. A. Stepanova and G. L. Rozhavin]

UDC 678.063.01.539.4

[Abstract] An analysis was conducted on the factors leading to improved working characteristics of driving belts prepared from polychloroprene bearing viscous fiber filler. Consequently, maleic anhydride was added to polychloroprene filled with BANAVIS viscous fibers in order to ensure optimum calendering behavior through fixation of anisotropy. Analysis of the physical properties showed a 1.5-fold improvement in transverse strength and performance. The improvements were attributed primarily to the grafting of maleic anhydride to the polychloroprene matrix and the fibrous filler, leading to additional fixation of the viscous fibers in the direction of calendering. Figures 1; tables 2; references 7 (Russian).

Crown Ether Catalysts for Bisphenolic Vulcanization of SKF-26

907M0142D Moscow KAUCHUK I REZINA in Russian No 3, Mar 91 pp 14-16

[Article by L. N. Lavrova and Z. N. Nudelman]

UDC 678.743.41-139.074.678.044.9

[Abstract] Crown ether 15-crown-5 (I), 18-crown-6 (II), and dibenzo-18-crown-6 (III) were evaluated for their suitablity as catalysts in bisphenolic vulcanization of SKF-26 rubber. The catalytic properties of the crown ethers were attributed to their internal cavities (I—0.17-0.22 nm; II and III—0.26-0.32 nm) which are sufficient to accomodate K and Ca ions. Assessment of vulcanization kinetics showed that an induction period was virtually eliminated with I, but the rate with the crown ethers was below that attained with the conventional catalyst TEBAKh [transliteration] due to a lower concentration of active ion pairs. Nevertheless, the slower rate of vulcanization yielded a more homogenous product that displayed greater tensile strength at elevated temperatures and was shown to sustain less deformation on compression. Figures 2; tables 1; references 6: 4 Russian, 2 Wester.

AMR: Novel Rubber Modifying Agent

907M0142E Moscow KAUCHUK I REZINA in Russian No 3, Mar 91 pp 17-19

[Article by V. N. Solodkiy, V. S. Kutyanina, O. S. Yefimova and Z. V. Onishchenko]

UDC 678.044

[Abstract] Comparative evaluation was conducted on the use of the conventional filler RU and a novel product AMR-30 in polyisoprene rubber (SKI-30). Physicomechanical testing of the products showed that use of AMR-30 offers considerable advantages over RU in addition to cost. Use of 1 part by weight of AMR-30 improved SKI-3 wear, temperature tolerance and adhesive characteristics to a greater extent than the use of 2 parts by weight of RU. Figures 2; tables 2; references 6 (Russian).

Guayule Rubber as New Commercial Factor

907M0142F Moscow KAUCHUK I REZINA in Russian No 3, Mar 91 pp 27-30

[Article by Ye. E. Potapov and Ye. G. Imnadze]

UDC 633.91:678.484

[Abstract] A review of largely Western literature is presented to demonstrate the advantages of guayule (Parthenium argentatum) cultivation in semiarid regions as a source of natural rubber in the USSR. Although serious attempts at the creation of guayule plantations in the USSR were discontinued in the 50s with the renewed availability of natural rubber from Indonesia and Malaysia, it remains an attractive alternative that deserves serious consideration. The considerations are both economic and technical, since the productive technology and qualities of guayule rubber are compatible with Soviet needs and technical expertise. With renewed interest in guayule rubber being displayed abroad, the USSR cannot afford to neglect this potential source of natural rubber. Tables 4; references 69: 8 Russian, 61 Western.

Impact of Modification of Reclaim Component on Properties of Rubber Product

907M0142G Moscow KAUCHUK I REZINA in Russian No 3, Mar 91 pp 31-32

[Article by Yu. V. Smironov, A. A. Delektorskiy, I. M. Agayants and A. P. Bobrov]

UDC 678.4.002.61.311.2

[Abstract] Physical testing was conducted on tire rubber compounded from polyisoprene rubber SKI-3 (100 parts by wt.), sulfur (1.5) and modified or unmodified Dispor reclaim (5). Modification of the reclaim involved addition of 5 parts by wt. of oxidized Ni-containing oligopiperylene to 100 parts of reclaim. The results, depicted in graphical and tabular forms, demonstrated that tire rubber prepared with modified reclaim displayed greater homogeneity and, consequently, improved mechanical properties. Figures 1; tables 1; references 3 (Russian).

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